

OMRON

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SAFETY, TECHNOLOGY & INNOVATION

Model **F3SG-4RR**-

Safety Light Curtain

EN

Safety Precautions

Thank you for purchasing the F3SG-RR Series Safety Light Curtain (hereinafter referred to as the "F3SG-RR"). Be sure to have F3SG-RR be handled by a "Responsible Person" who is well aware of and familiar with the machine to be installed. The term "Responsible Person" used in this document means the person qualified, authorized and responsible to secure "safety" in each process of the design, installation, operation, maintenance services and disposition of the machine. It is assumed that F3SG-RR will be used properly according to the installation environment, performance and function of the machine. Responsible Person should conduct risk assessment on the machine and determine the suitability of this product before installation. Read this document and reference manuals for F3SG-RR thoroughly to understand and make good use of the descriptions before installing and operating the product. Keep this document at the place where the operator can refer to whenever necessary.

This device is electro-sensitive protective equipment for the purpose of protecting the human body.

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Original instructions

①

9309799-2E

Instructions in the EU languages and a signed EU Declaration of Conformity are available on our website at [www.industrial.omron.eu/safety](http://www.industrial.omron.eu/safety).

Declaration of Conformity

OMRON declares that the F3SG-RR is in conformity with the requirements of following EU Directives and UK Legislations:  
EU: Machinery Directive 2006/42/EC, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU,  
UK: 2008 No 1597 Machinery (Safety) , 2016 No 1091 EMC, 2012 No 3032 RoHS

Safety Standards

The F3SG-RR is designed and manufactured according to the following standards.  
EN61496-1 (Type 4 ESPE), EN 61496-2 (Type 4 AOPD),  
EN61508-1 through -4 (SIL 3), EN ISO 13849-1:2015 (PL e, Category 4)

Safety Precautions

●**Indications and Meanings for Safe Use**  
The precautions listed in this document indicated by alert symbols and statements must be followed for the safe use of the F3SG-RR. Failure to follow all precautions and alerts may result in an unsafe use or operation.Thoroughly read this document before using the F3SG-RR.  
The following word and symbols are used in this document.

● <b>Meaning of Signal Word</b>	
<div><div><div>⚠</div><div>DANGER</div></div></div>	Indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or may result in death. Additionally there may be severe property damage.
<div><div><div>⚠</div><div>WARNING</div></div></div>	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

● <b>Alert Statements</b>	
<div><div><div>⚠</div><div>DANGER</div></div></div>	
<div><div><div>ⓘ</div><div>Stop the machine immediately if the F3SG-RR and the machine installed with the F3SG-RR does not operate as intended.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Make sure to test the operation of the F3SG-RR after setting with Rotary Switch and/or End Cap to verify that the F3SG-RR operates as intended. Make sure to stop the machine until the test is complete. Unintended settings may cause a person to go undetected, resulting in serious injury or death.</div></div></div>	<div><div><div>ⓘ</div></div></div>

For users	
<div><div><div>⚠</div><div>WARNING</div></div></div>	
<div><div><div>ⓘ</div><div>The F3SG-RR must be installed, configured, and incorporated into a machine control system by a sufficiently trained and qualified person. An unqualified person may not be able to perform these operations properly, which may cause a person to go undetected, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>

For machines	
<div><div><div>⚠</div><div>WARNING</div></div></div>	
<div><div><div>⊘</div><div>Do not use this sensor for machines that cannot be stopped by electrical control. For example, do not use it for a pressing machine that uses full-rotation clutch. Otherwise, the machine may not stop before a person reaches the hazardous part, resulting in serious injury.</div></div></div>	<div><div><div>⊘</div></div></div>
<div><div><div>ⓘ</div><div>To use F3SG-RR in PSDI mode (initiation of cycle operations by a presence sensing device), you must configure an appropriate circuit between F3SG-RR and the machine.For details about PSDI, refer to OSHA1910.217, IEC61496-1, and other relevant standards and regulations.</div></div></div>	<div><div><div>ⓘ</div></div></div>

For installation	
<div><div><div>⚠</div><div>WARNING</div></div></div>	
<div><div><div>ⓘ</div><div>Make sure Responsible Person tests the operation of the F3SG-RR after installation to verify that the F3SG-RR operates as intended. Make sure to stop the machine until the test is complete. Unintended installation, wiring or function settings may cause a person to go undetected, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Make sure to install the F3SG-RR at the safe distance from the hazardous part of the machine. Otherwise, the machine may not stop before a person reaches the hazardous part, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Install a protective structure so that the hazardous part of a machine can only be reached by passing through the sensor's detection zone. If access to the hazardous part by reaching over the detection zone of a vertically mounted F3SG-RR cannot be excluded, the height of the detection zone and the safety distance shall be determined in consideration of such a risk. Install the sensors so that part of the person is always present in the detection zone when working in a machine's hazardous zones. If a person is able to step into the hazardous zone of a machine and remain behind the F3SG-RR's detection zone, configure the system with restart interlock function. Failure to do so may result in serious injury due to unexpected startup.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Install the reset switch in a location that provides a clear view of the entire hazardous zone and where it cannot be activated from within the hazardous zone.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Install the pre-reset switch always in the hazardous zone and where it cannot be activated from outside the hazardous zone.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>The F3SG-RR cannot protect a person from a projectile exiting the hazardous zone. Install protective cover(s) or fence(s).</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>When the fixed blanking or floating blanking function is used, observe the following. Failure to do so may cause a person to go undetected, resulting in serious injury.<ul style="list-style-type: none"><li>• Responsible Person must verify that a test rod is detected for all detection zones except the blanked area.</li><li>• When the fixed blanking function is used, install a protective structure to cover the whole blanked area in order to prevent personnel approach to hazardous part of the machine through the blanked area.</li></ul></div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Detection capability gets larger when fixed/floating blanking or reduced resolution function is used. When these functions are used, the safety distance calculation must be based on the increased detection capability for these functions. Otherwise the machine may not stop before a person reaches to the hazardous part, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>⊘</div><div>Warning zone output is non-safety output. You must not include it to calculation of safety distance. Otherwise safety distance may be reduced, resulting in serious injury.</div></div></div>	<div><div><div>⊘</div></div></div>
<div><div><div>⊘</div><div>A warning zone must not be used for safety applications. Always install your system so that a detection zone should be passed before reaching a hazardous part of the machine. If access to the hazardous part by reaching over the detection zone of a vertically mounted F3SG-RR cannot be excluded, the height of the detection zone and the safety distance shall be determined in consideration of such a risk.</div></div></div>	<div><div><div>⊘</div></div></div>
<div><div><div>ⓘ</div><div>When a warning zone is configured, you must attach labels that indicate a border between normal detection zone and warning zone. Otherwise the machine may not stop before a person reaches to the hazardous part, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>A warning zone must be configured based on a safety distance.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>The muting and override functions disable the safety functions of the device. You must ensure safety using other method when these functions are operating.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Install muting sensors so that they can distinguish between the object that is being allowed to pass through the detection zone and a person. If the muting function is activated by the detection of a person, the machine may not stop operating, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Muting lamps that indicate the state of the muting and override functions must be installed where they are clearly visible to workers from all the operating positions.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Use 2 independent input devices for muting inputs. Failure to do so may result in a muting status due to a single muting sensor's failure.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>You must install F3SG-RR, muting sensor, and physical barrier, and configure time settings for muting so that an operator should not enter hazardous zone.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>The Dynamic Muting function can configure a new muting zone after muting is enabled based on a result measuring a workpiece height for a certain period of time. The function must be completely verified by a trained and qualified person before being used. Take additional safety measures if necessary.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Install the switch to activate the override function in a location that provides a clear view of the entire hazardous zone and where it cannot be activated from within the hazardous zone. Make sure that nobody is in the hazardous zone before activating the override function.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Override time must be properly configured for its application by a sufficiently trained and qualified person.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Make sure to connect an override cancel switch to the Reset line when using the override function. Otherwise the override state may not be released by the override cancel switch, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>When muting error occurs with workpiece blocking the F3SG-RR, there are two methods to forcibly remove the workpiece. 1) Manual operation (with additional safety measure); or 2) Override function (Override at Normal Operation / Override upon Startup) Only one of the methods, either 1) or 2) must be used. If they are used at the same time, the override may be activated at an unexpected timing.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Install F3SG-RR so that it is not affected by reflective surfaces. Failure to do so may hinder detection, resulting in serious injury. For an installation distance from reflective surfaces, see the User's Manual.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>When using more than 1 set of F3SG-RR in adjacent areas, the emitter of one F3SG-RR may interfere with the receiver of the other, causing the safety functions to stop working properly. Install, configure and maintain them so that mutual interference does not occur.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Make sure that foreign material such as water, oil, or dust does not enter the F3SG-RR or the connector while the cap is removed.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>To change the response time, calculate the safety distance based on the setting. Otherwise, the machine may not stop before a person reaches the hazardous part, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>

<div><div><div>⚠</div><div>WARNING</div></div></div>	
<div><div><div>ⓘ</div><div>Do not use the sensor system with mirrors in a retro-reflective configuration as shown below. Doing so may hinder detection. It is possible to use mirrors to alter the detection zone to a 90-degree angle.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>Position with retro-reflection</div></div><div><div><div>ⓘ</div><div>Position with detection zone bent at 90</div></div></div></div>	
<div><div><div>ⓘ</div><div>Perform an inspection for all F3SG-RR as described in the User's Manual. When using cascade connections, perform inspections for every connected F3SG-RR.</div></div></div>	<div><div><div>ⓘ</div></div></div>

For wiring	
<div><div><div>⚠</div><div>WARNING</div></div></div>	
<div><div><div>ⓘ</div><div>When using the PNP output, connect the load between the output and 0 V line. When using the NPN output, connect the load between the output and +24 VDC line. Connecting the load between the output and a different power supply line from the above will result in a dangerous condition because the operation mode of safety output is reversed to "Dark-ON".</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>⊘</div><div>When using the PNP output, do not ground +24 VDC line. When using the NPN output, do not ground 0 V line. Otherwise, a ground fault may turn the safety output ON, resulting in a failure of stopping the machine.</div></div></div>	<div><div><div>⊘</div></div></div>
<div><div><div>ⓘ</div><div>Configure the system by using the optimal number of safety outputs that satisfy the requirements of the necessary safety category.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>⚡</div><div>Do not connect each line of F3SG-RR to a DC power supply of higher than 24 VDC+20%. Also, do not connect it to an AC power supply. Failure to do so may result in electric shock.</div></div></div>	<div><div><div>⚡</div></div></div>
<div><div><div>ⓘ</div><div>Make sure to perform wiring while the power supply is OFF.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>⊘</div><div>Do not use the auxiliary output for safety applications. Failure to do so may result in serious injury when the F3SG-RR fails.</div></div></div>	<div><div><div>⊘</div></div></div>
<div><div><div>ⓘ</div><div>For the F3SG-RR to comply with IEC 61496-1 and UL 508, the DC power supply unit must satisfy all of the following conditions:<ul style="list-style-type: none"><li>• Must be within the rated power voltage (24 VDC ± 20%)</li><li>• Must have tolerance against the total rated current of devices if it is connected to multiple devices</li><li>• Must comply with EMC directives (industrial environment)</li><li>• Double or reinforced insulation must be applied between the primary and secondary circuits</li><li>• Automatic recovery of overcurrent protection characteristics</li><li>• Output holding time must be 20ms or longer</li><li>• Must satisfy output characteristic requirements for class 2 circuit or limited voltage current circuit defined by UL508.</li><li>• Must comply with laws and regulations, regarding EMC and electrical equipment safety, of the country or region where the F3SG-RR is used (For example, in EU, the power supply must comply with the EMC Directive and the Low Voltage Directive.)</li></ul></div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>⚡</div><div>Double or reinforced insulation from hazardous voltage must be applied to all input and output lines. Failure to do so may result in electric shock.</div></div></div>	<div><div><div>⚡</div></div></div>
<div><div><div>ⓘ</div><div>Extension of the cable must be within a specified length. If it isn't, safety function may not work properly, resulting in danger.</div></div></div>	<div><div><div>ⓘ</div></div></div>

Settings	
<div><div><div>⚠</div><div>WARNING</div></div></div>	
<div><div><div>ⓘ</div><div>Some settings of functions or the Setting Recovery function configurable with the configuration software, SD Manager 2 may increase risks. Make sure the Responsible Person conduct a thorough risk assessment analysis before managing and changing the settings. Unintended changes to the settings may cause a person to go undetected resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>ⓘ</div><div>After completion of teach-in, check that the configuration have been properly done.</div></div></div>	<div><div><div>ⓘ</div></div></div>

Other	
<div><div><div>⚠</div><div>WARNING</div></div></div>	
<div><div><div>⊘</div><div>Do not try to disassemble, repair, or modify this product. Doing so may cause the safety functions to stop working properly.</div></div></div>	<div><div><div>⊘</div></div></div>
<div><div><div>⊘</div><div>Do not use the F3SG-RR in environments where flammable or explosive gases are present. Doing so may result in explosion.</div></div></div>	<div><div><div>⊘</div></div></div>
<div><div><div>ⓘ</div><div>Perform daily and 6-month inspections for the F3SG-RR as described in the User's Manual. Otherwise, the system may fail to work properly, resulting in serious injury.</div></div></div>	<div><div><div>ⓘ</div></div></div>
<div><div><div>⊘</div><div>Do not use the F3SG-RR in environments where strong magnetic field may be produced. Doing so may cause the safety functions to stop working properly.</div></div></div>	<div><div><div>⊘</div></div></div>

Precautions for Safe Use

Make sure to observe the following precautions that are necessary for ensuring safe use of the product.

- Do not install the F3SG-RR in the following types of environments:
  - Areas exposed to intense interference light, such as direct sunlight
  - Areas with high humidity where condensation is likely to occur
  - Areas where corrosive gases are present
  - Areas exposed to vibration or shock levels higher than in the specification provisions
  - Areas where the pollution degree is harsher than 3, such as outdoor environment
  - Areas where the product may get wet with oil that can solve adhesive
  - Areas where foreign material such as spatter adheres to the F3SG-RR
- Loads must satisfy both of the following conditions:
  - Not short-circuited
  - Not used with a current that is higher than the rating
- Do not drop the product
- Dispose of the product in accordance with the relevant rules and regulations of the country or area where the product is used.
- Make sure that the F3SG-RR is securely mounted and its cables and connectors are properly secured with the torque recommended in the User's Manual.
- Do not apply excessive force (0.2 N•m or more) to the Rotary Switch when operating it. Doing so may damage and make the Rotary Switch inoperable. Do not operate the Rotary Switch with tools that may damage the product.
- Bending radii of cables must be equal to or higher than specified minimum values.
- When replacing the cable connectors with other types of connectors, use connectors that provide a protection grade of IP54 or higher.

- Be sure to route the input/output lines for the F3SG-RR separate from high-potential power lines or through an exclusive conduit.
- To extend a cable length with a cable other than the dedicated cable, use a cable with the same or superior specifications.
- Use the F39-JD□RA cables in environment where the product may be exposed to oil. Using the other cables in such an environment may cause cutting oils or other substances to enter the cables, resulting in a risk of damaging or burning the product.
- Interface Unit F39-GIF-1 is dedicated to the F3SG-RR series. Do not use it for F3SJ-A, F3SJ-E/B or F3SG-RA series.
- When powering on the F3SG-RR with the Interface Unit being connected to the F3SG-RR, the PC COM lines (or MUTE A and B lines) must be open. Otherwise the F3SG-RR goes to the Lockout state or does not send the safety outputs (OSSDs).
- Read and understand the User's Manual for setting with the Rotary Switch and End Cap.
- The rated life of the LEDs used for this product is 6 years.
- Some cutting oils may affect the product. Before using cutting oils, make sure that the oils should not cause deterioration or degradation of the product.
- Do not use the product with degraded protective structure such as swelling and crack in housing and/or sealing components. Otherwise cutting oil or other substance may enter the product, resulting in a risk of corruption or burning.

Reference Manuals	
<div><div><div>Document Title</div><div>Safety Light Curtain F3SG-RR Series User's Manual</div></div></div>	<div><div><div>Cat. No.</div><div>Z383-E1</div></div></div>
<div><div><div>Safety Light Curtain F3SG-RR Series Quick Installation Manual</div></div></div>	<div><div><div>9308038-0</div></div></div>

In the interest of product improvement, specifications are subject to change without notice.

For more information, visit

Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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