NEW

Wire-saving Devices

for F3SJ Safety Light Curtains

OMRON

The key to Reducing wiring for Safety Systems

To Connect to Muting Sensors:

F39-TC5
Connector Terminal Box

To Connect to Safety Relays:

F3SP-T01
Safety Terminal Relay

realizing

These new Wire-saving Devices enable eas

To Connect to Muting Sensors: F39-TC5 Connector Terminal Box ➡P6

Significantly reduces the number of wires between the Safety Light Curtain and the Muting Sensors.

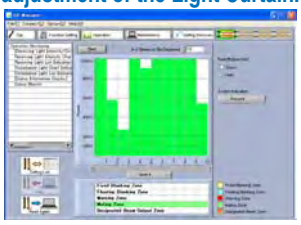
● Significantly reduces the number of wires between the Safety Light Curtain and Muting Sensors.

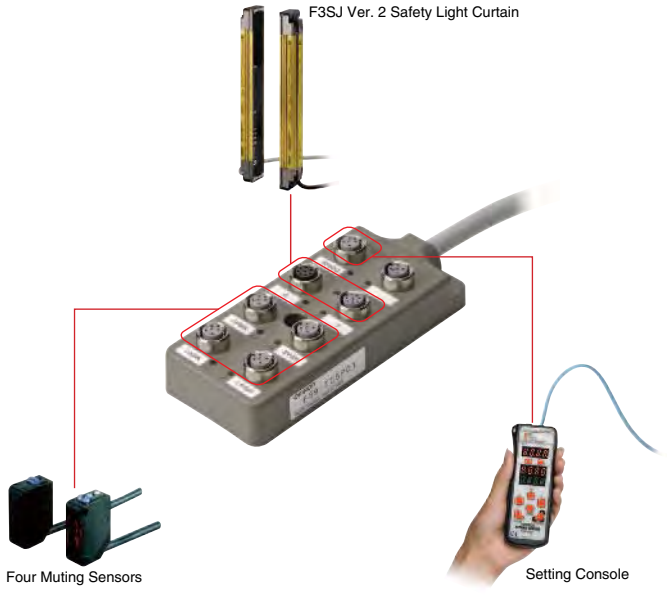
Provides IP67 protection against water and dust.

The wiring status can be checked at a glance with the LED indicators.

Connection using connectors significantly reduces the wires.

The Setting Software can be connected, enabling on-site adjustment of the Light Curtain.

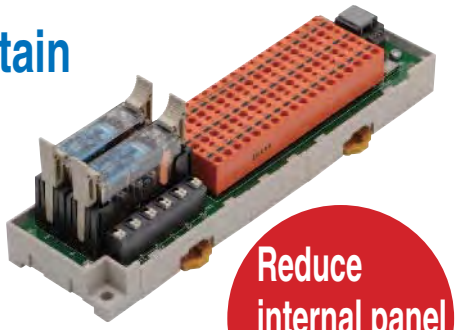




sily using the muting function of the F3SJ.

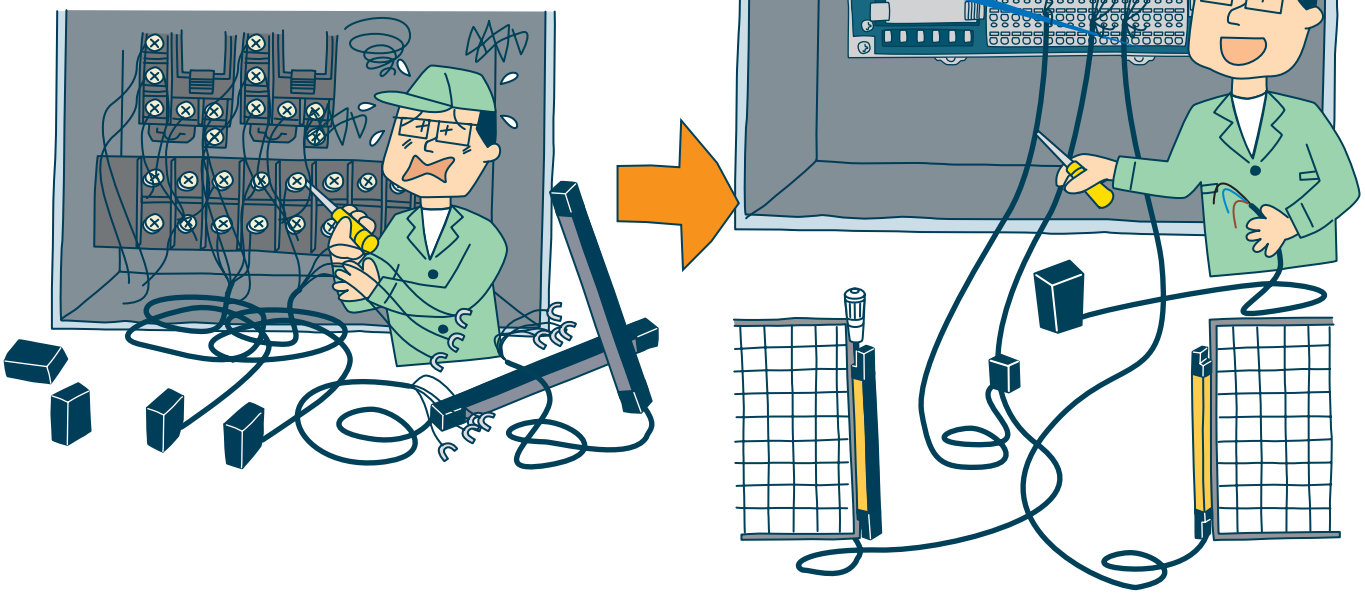
To Connect to Safety Relays: F3SP-T01 Safety Terminal Relay ➡P14

Simplifies the wiring from the Safety Light Curtain to the Safety Relay outputs.



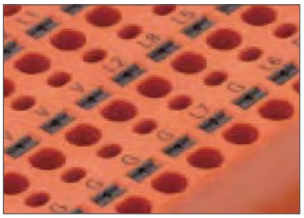
Use the Safety Terminal Relay to clear up messy wiring and inside the panel.
Simplifying the connections also helps prevent incorrect wiring.

Reduce internal panel wiring!

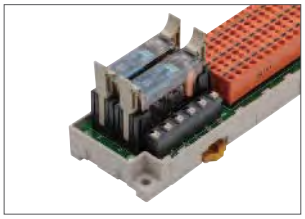


● Complicated wiring for safety system is made easy.

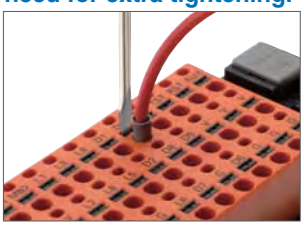
Terminals are numbered to make it easy to check the terminal connections.



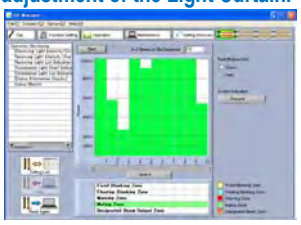
Replacement of relays is easy, improving maintainability.

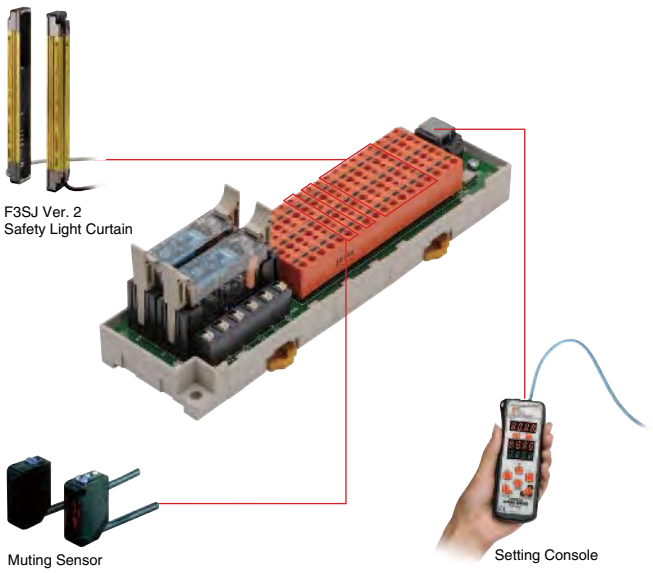


Screw-less clamp terminals eliminate the need for extra tightening.



The Setting Software can be connected, enabling on-site adjustment of the Light Curtain.



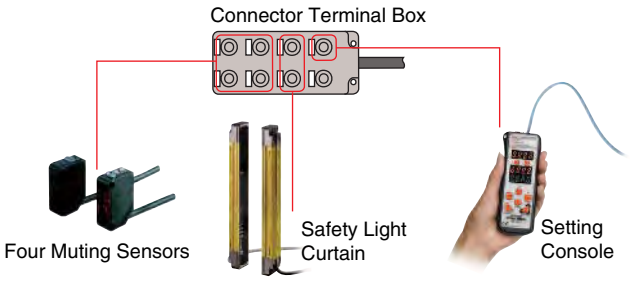


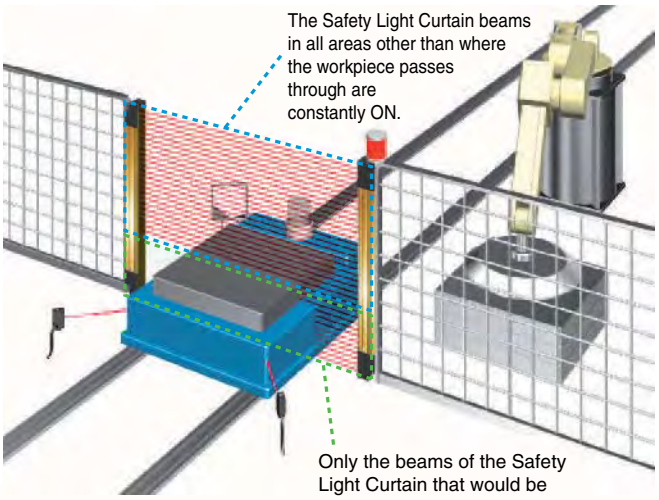
The Muting Function increases

The Safety Light Curtain can be used without lowering productivity.

Partial muting

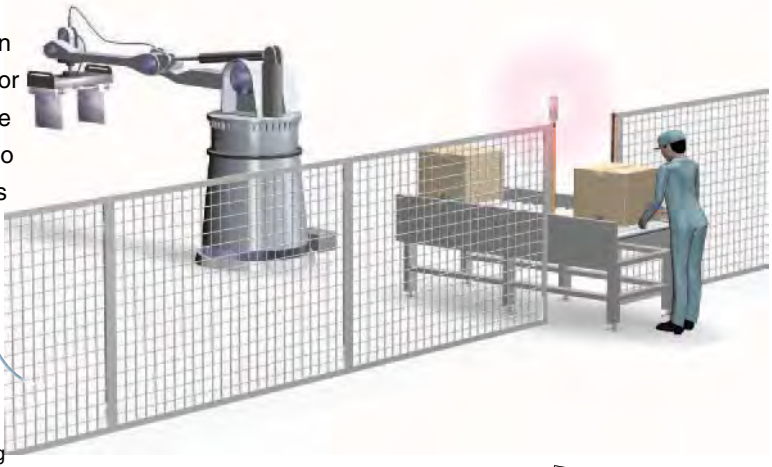
Partial muting raises safety by muting only the beams of the Safety Light Curtain in the area where the workpiece passes through, while preventing muting in all other areas.

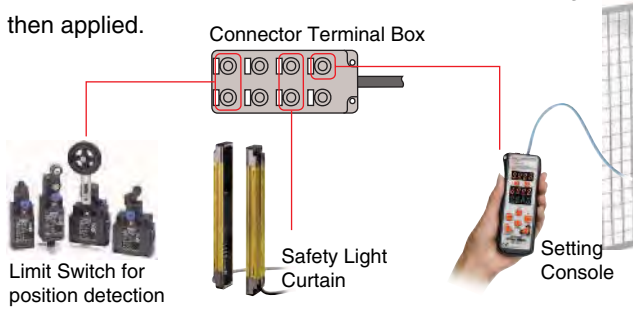




Position detection muting

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.

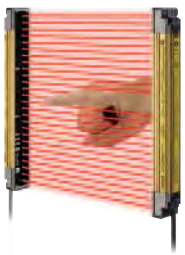




F3SJ Ver. 2 Safety Light Curtain (Type 4)

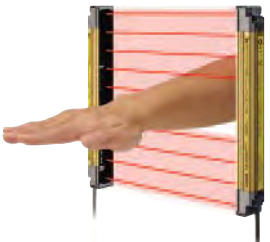
Cat. No. F074

For areas where there is only a short distance to the source of danger, select a finger-protection model. For areas where there is some distance to the hazardous point and where the machinery stops with sufficient time to spare, choose an economical hand/arm/body protection model. There are a variety of products so select the appropriate model for your application.



Finger-protection Detection
Capability: 14 mm diameter
(Beam gap: 9 mm)

Hand-protection Detection
Capability: 20 mm diameter
(Beam gap: 15 mm)



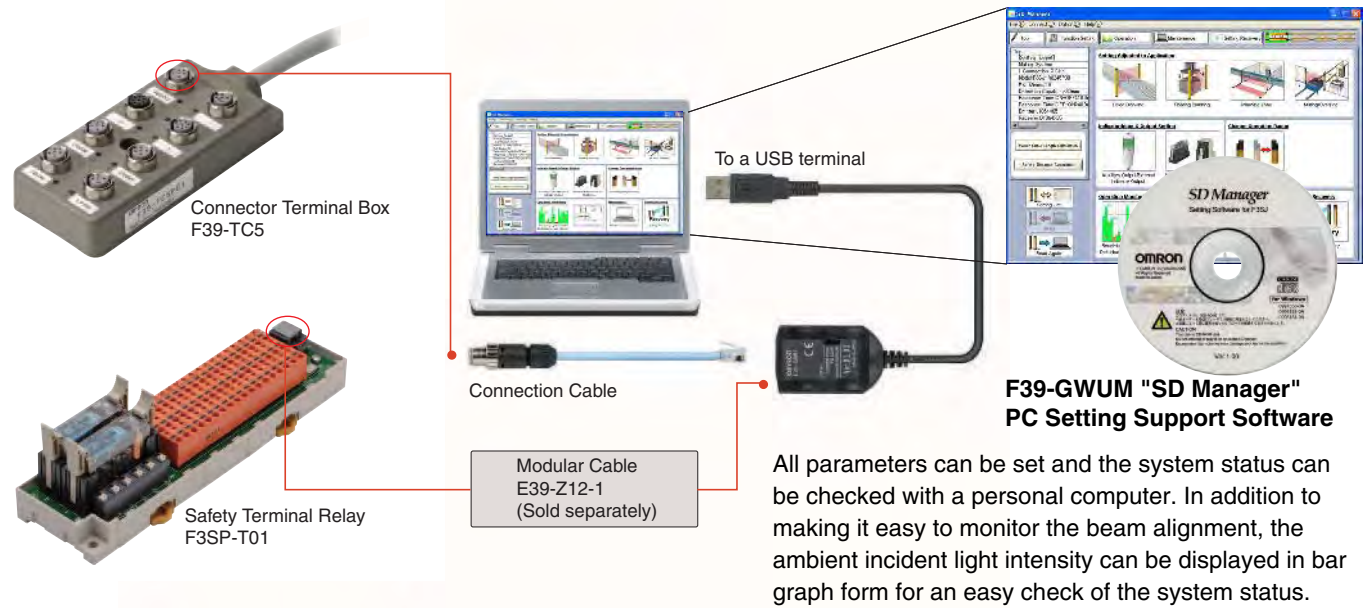
Hand/arm-protection Detection
Capability: 30 mm diameter
(Beam gap: 25 mm)

NEW
Leg/body-protection and Presence Detection
Capability: 55 mm diameter
(Beam gap: 50 mm)

the possible application sites.

Support Software for Setting and Monitoring Safety Light Curtains

"SD Manager" PC Setting Support Software

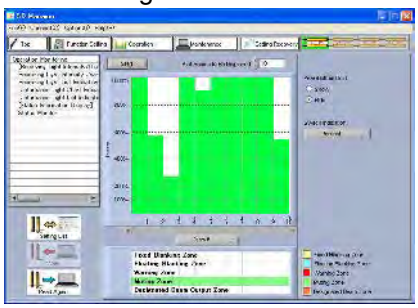


**F39-GWUM "SD Manager"
PC Setting Support Software**

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.

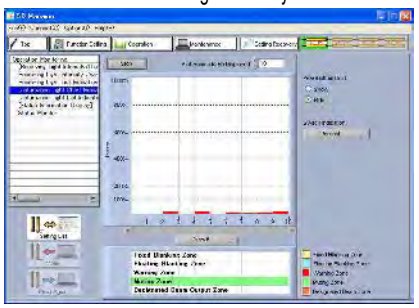
The "SD Manager" PC Setting Support Software helps reduce the time required for installing and troubleshooting the Safety Light Curtain.

● Beam alignment is easier.



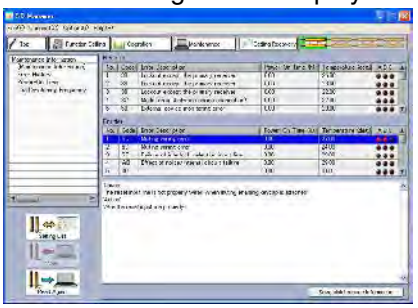
The incident light level can be displayed in a bar graph for each beam.

● The ambient incident light intensity can be checked.



The incident light level when the light emission of the Safety Light Curtain is stopped is displayed in a bar graph.

● The error log can be displayed.



The cause of the errors and countermeasures are both displayed.

The Setting Software can be connected to the Wire-saving Devices for F3SJ, enabling on-site adjustment of the Light Curtain.

Connector Terminal Box (Muting Terminals for F3SJ-A)

F39-TC5

Significantly reduces amount of wiring between Safety Light Curtains and Muting Sensors.

Pending

NEW

- Provides IP67 protection against water and dust.
- Connection using connectors significantly reduces wiring work.
- The wiring status can be checked at a glance with the LED indicators.
- The Support Software can be connected, enabling on-site adjustment of a Light Curtain.

⚠ Refer to *Safety Precautions* on page 12.

Ordering Information

Connector Terminal Box

Classification	Applicable models	Specification	Type	Model
Muting Terminals	F3SJ-A□□□□P□□	PNP	Model with Muting Sensor Output Mode	**F39-TC5P01**
			Model with Override Mode	**F39-TC5P02**
	F3SJ-A□□□□N□□	NPN	Model with Muting Sensor Output Mode	**F39-TC5N01**
			Model with Override Mode	**F39-TC5N02**

Optional Accessories (Sold separately)

Classification	Appearance	Model	Number per box
Short-circuit Connector		**F39-CN8**	---
Waterproof Covers		**XS2Z-22**	50

Note: One short-circuit connector is included with the F39-T□01 for Muting Sensors.
Three waterproof covers are included with a Connector Terminal Box with Muting Sensor Output Mode (F39-TC5□01) and four waterproof covers with a Connector Terminal Box with Override Mode (F39-TC5□02).
Order the above accessories only as spare parts.

Specifications (Refer to Instruction Sheet for details.)

Ratings

Rated voltage	24 VDC (±20% at ambient temperature of 20°C)
Rated current	Power line: 2.4 A, Signal line: 0.3 A

Characteristics

Contact resistance	40 mΩ max. (connector section)
Insulation resistance	After applying 500 VDC for 60 s: 100 MΩ min.
Vibration resistance	Speed: 10 Hz to 500 Hz to 10 Hz in 20 minutes. Simple vibration with full amplitude of 1.52 mm or 98 m/s^2 (whichever has the smaller amplitude) for two hours each in three directions X, Y, and Z (total of 6 hours). Measured while connector is connected.
Shock resistance	490 m/s^2 for 11 ms three times each along three axes, six directions X, Y, and Z (total of 18 times). Measured while connector is connected. (MIL-STD-202F Test 213B, Condition A)
Ambient operating temperature	–25 to 70°C (with no icing or condensation)
Ambient operating humidity	25% to 85% (with no icing or condensation)
Degree of protection	IP67
Accessories	Short-circuit connector (models with Muting Sensor outputs only), waterproof cover

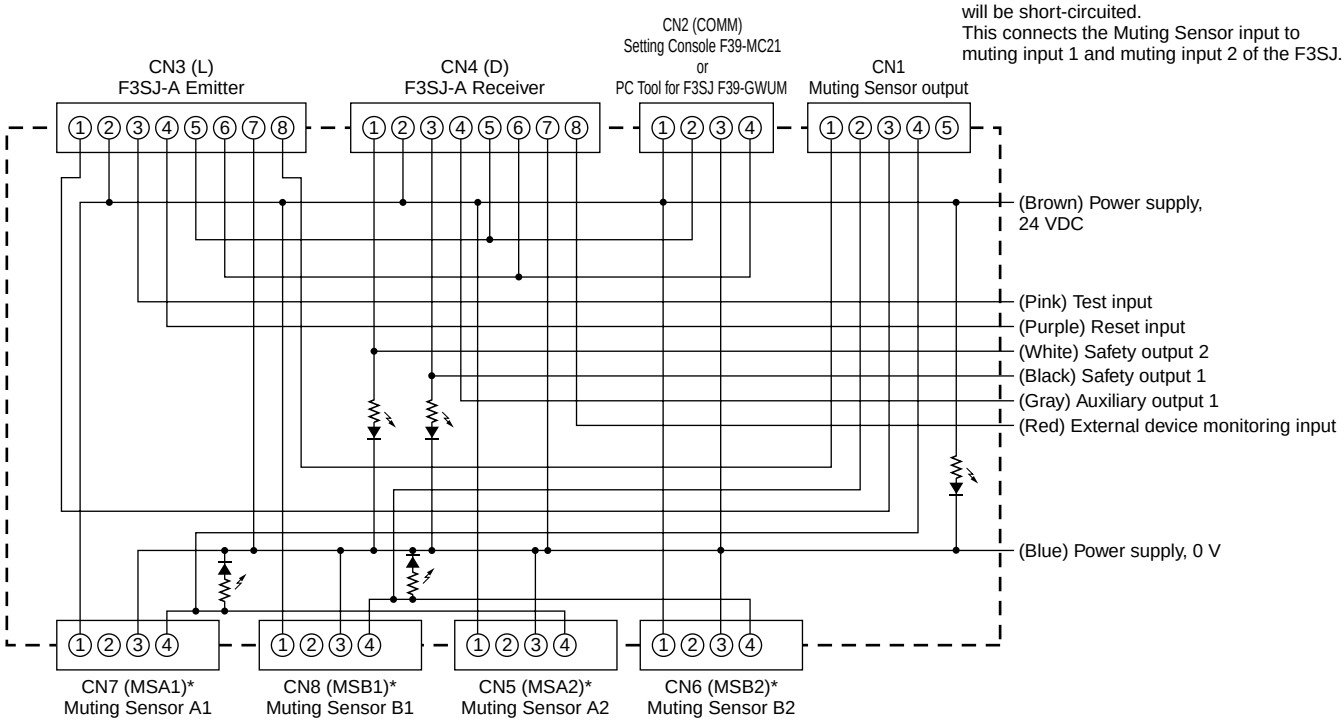
Wiring Diagrams

Internal Circuit Diagrams

PNP

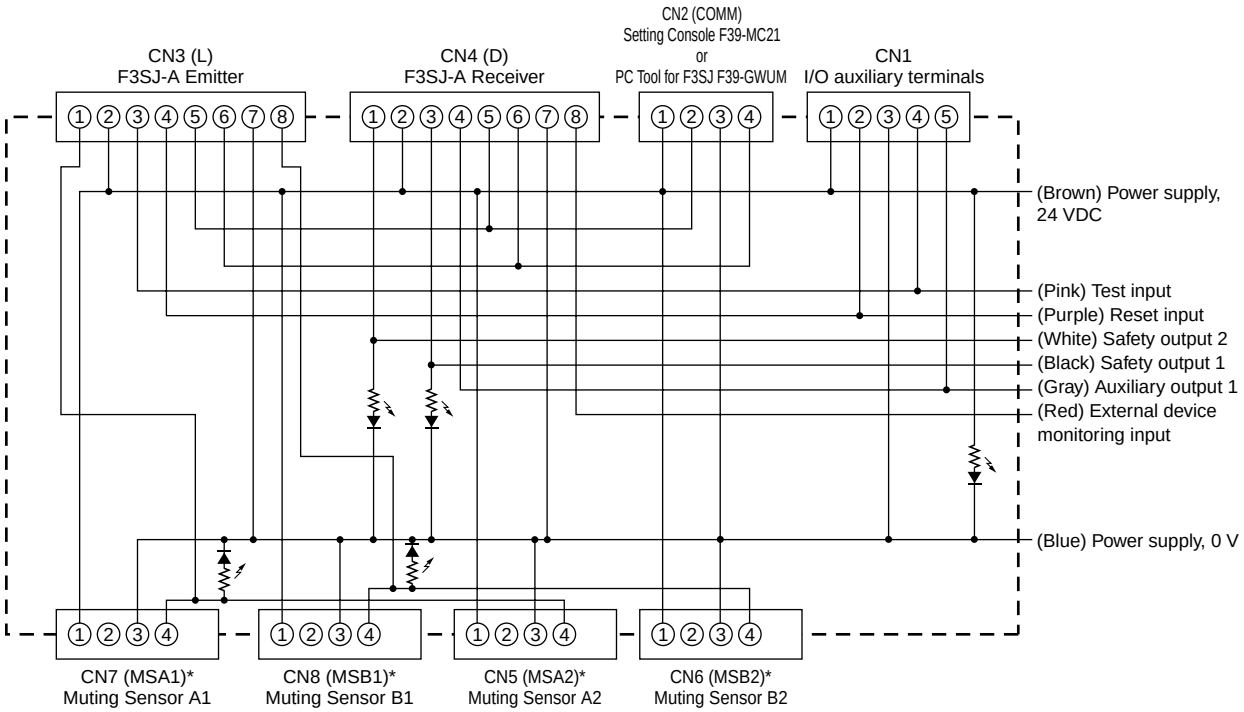
Model with Muting Sensor Output Mode F39-TC5P01

Note: When a short-circuit connector is connected to CN1, terminals 1 and 2, and terminals 3 and 4 will be short-circuited.
This connects the Muting Sensor input to muting input 1 and muting input 2 of the F3SJ.



* Use the following connecting cable to connect the Muting Sensors:
M12, 4-pin connector (Pin 1: +24 V, Pin 2: Not used, Pin 3: 0 V, Pin 4: Output)
When using a Through-beam Photoelectric Sensor, use an XS2R-D426-□11-F Y-joint with Socket and Plug or similar product to connect the transmitter and receiver.

Model with Override Mode F39-TC5P02

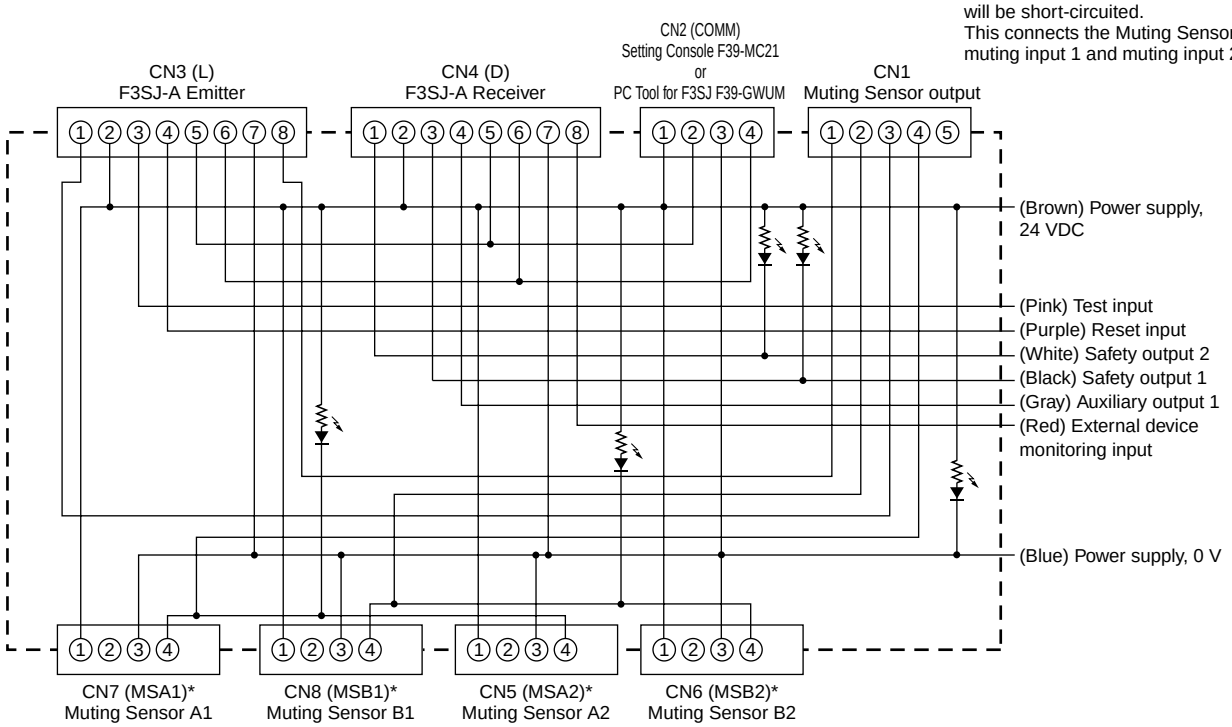


* Use the following connecting cable to connect the Muting Sensors:
M12, 4-pin connector (Pin 1: +24 V, Pin 2: Not used, Pin 3: 0 V, Pin 4: Output)
When using a Through-beam Photoelectric Sensor, use an XS2R-D426-□11-F Y-joint with Socket and Plug or similar product to connect the transmitter and receiver.

NPN

Model with Muting Sensor Output Mode F39-TC5N01

Note: When a short-circuit connector is connected to CN1, terminals 1 and 2, and terminals 3 and 4 will be short-circuited.
This connects the Muting Sensor input to muting input 1 and muting input 2 of the F3SJ.



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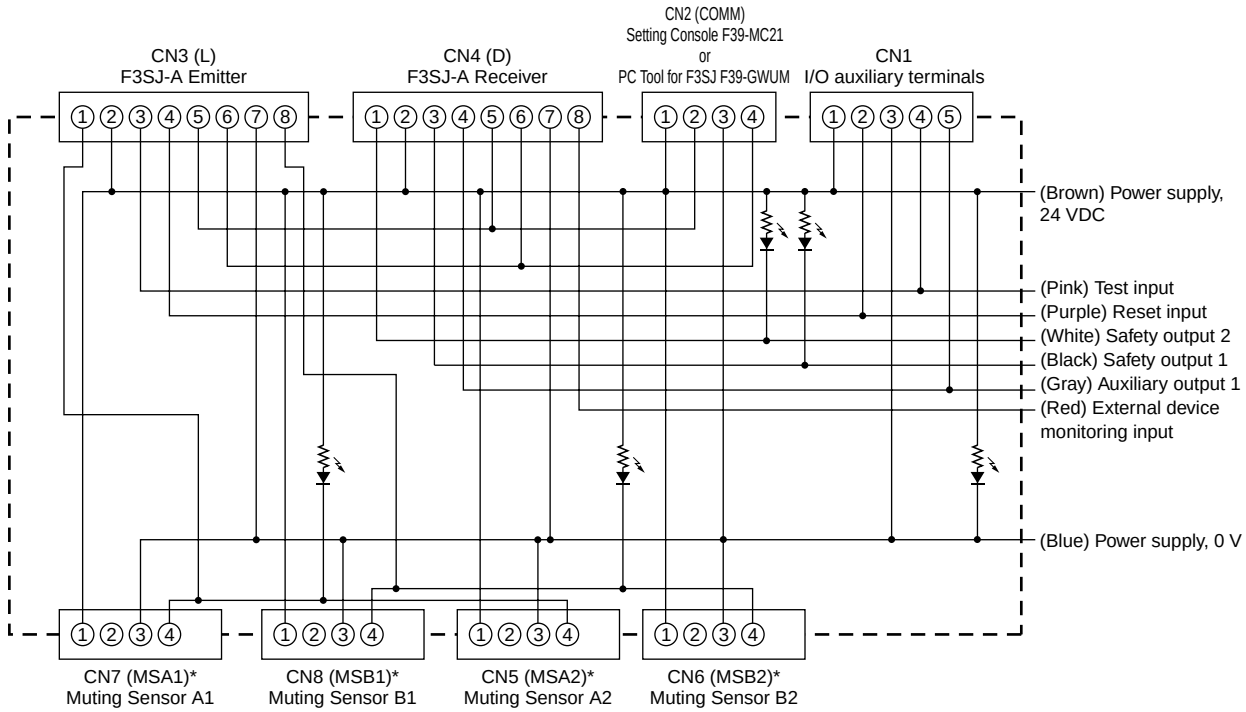
M12, 4-pin connector (Pin 1: +24 V, Pin 2: Not used, Pin 3: 0 V, Pin 4: Output)
When using a Through-beam Photoelectric Sensor, use an XS2R-D426-□11-F Y-joint with Socket and Plug or similar product to connect the transmitter and receiver

Model with Override Mode F39-TC5N02

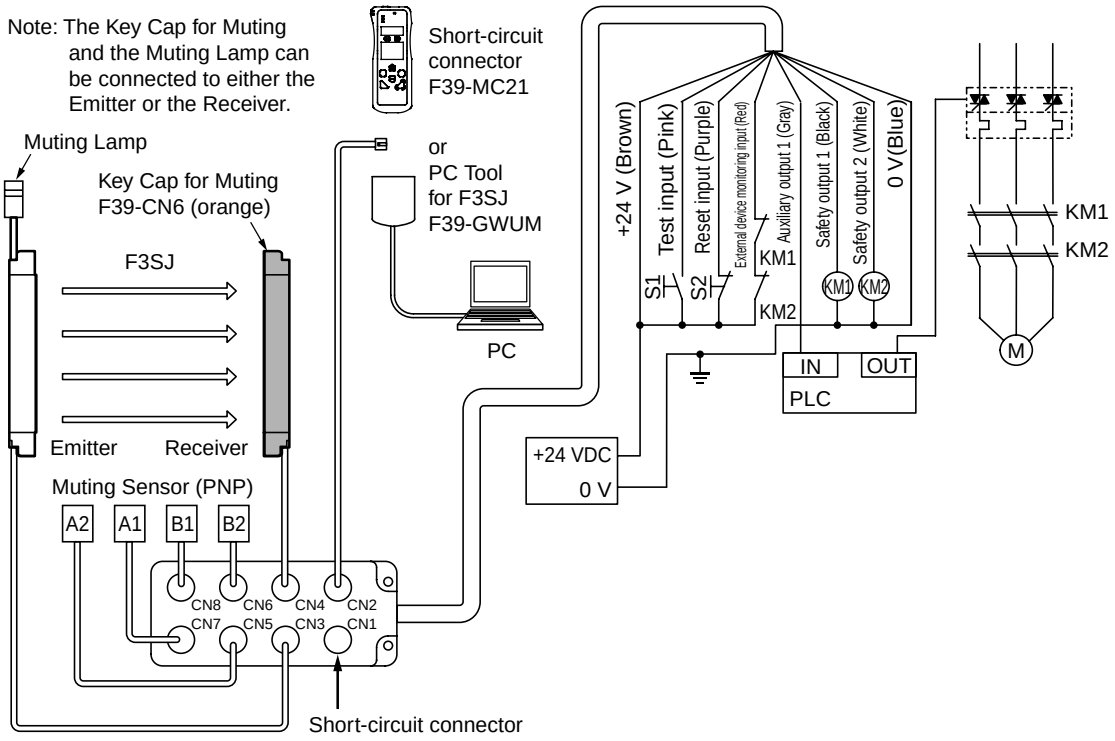


*Use the following connecting cable to connect the Muting Sensors:
M12, 4-pin connector (Pin 1: +24 V, Pin 2: Not used, Pin 3: 0 V, Pin 4: Output)
When using a Through-beam Photoelectric Sensor, use an XS2R-D426-□11-F Y-joint with Socket and Plug or similar product to connect the transmitter and receiver.

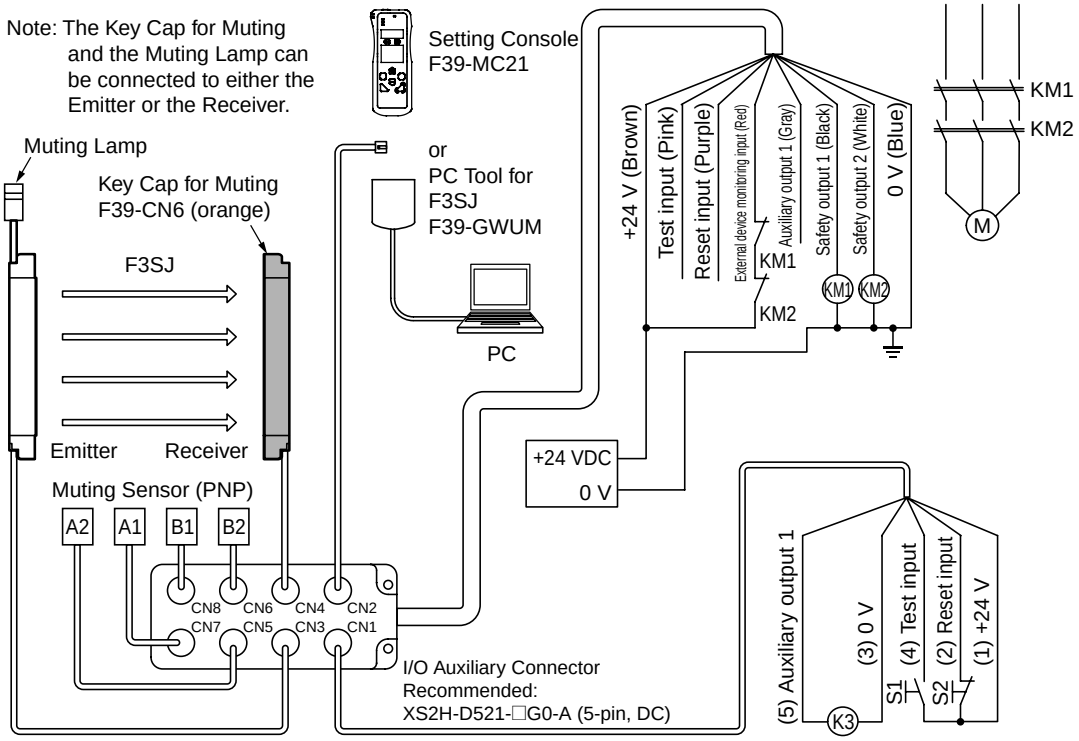
Wiring Diagrams

PNP

Model with Muting Sensor Output Mode F39-TC5P01

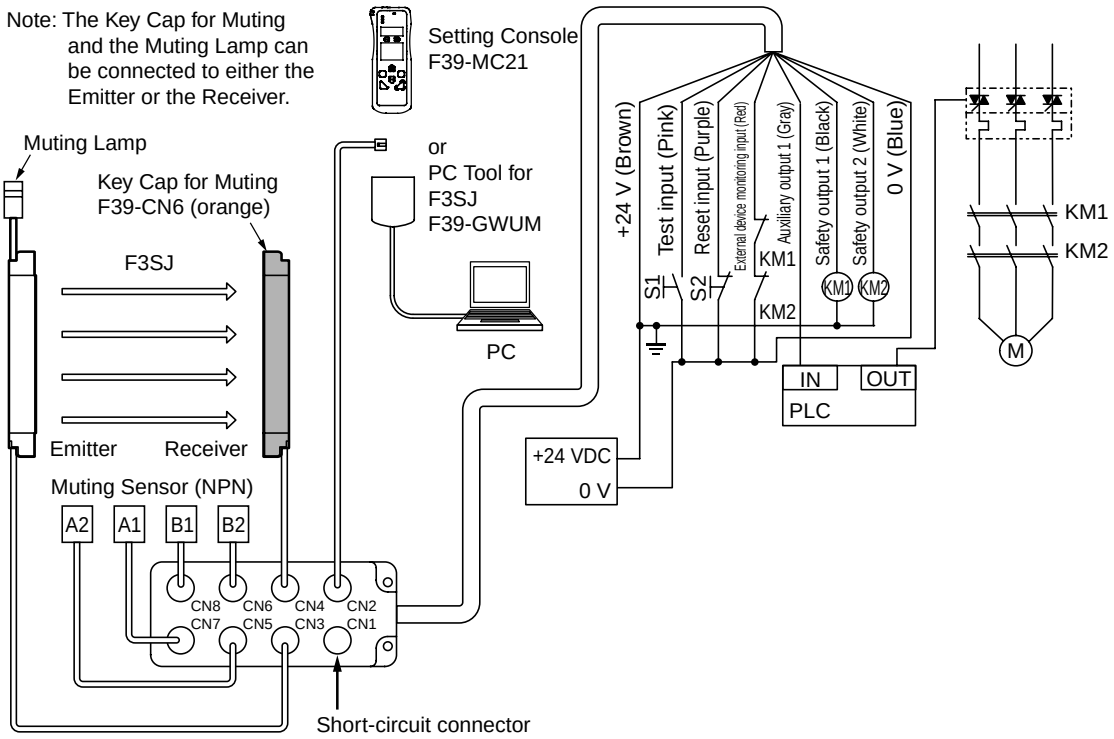


Model with Override Mode F39-TC5P02

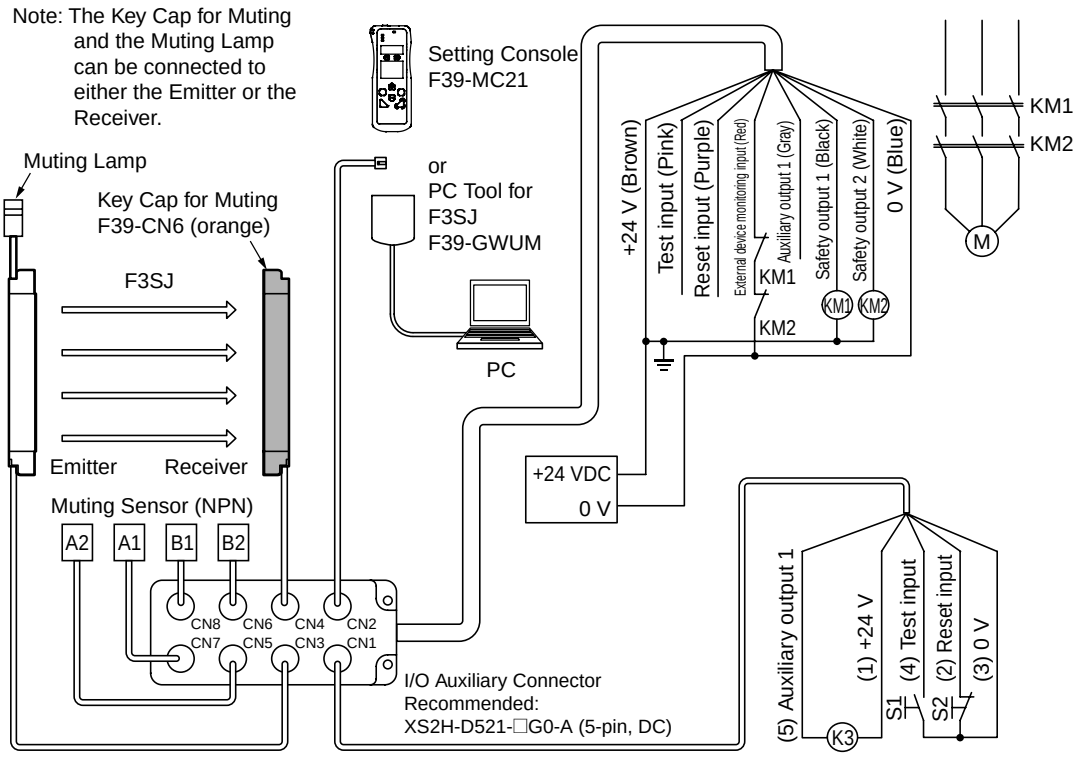


NPN

Model with Muting Sensor Output Mode F39-TC5N01



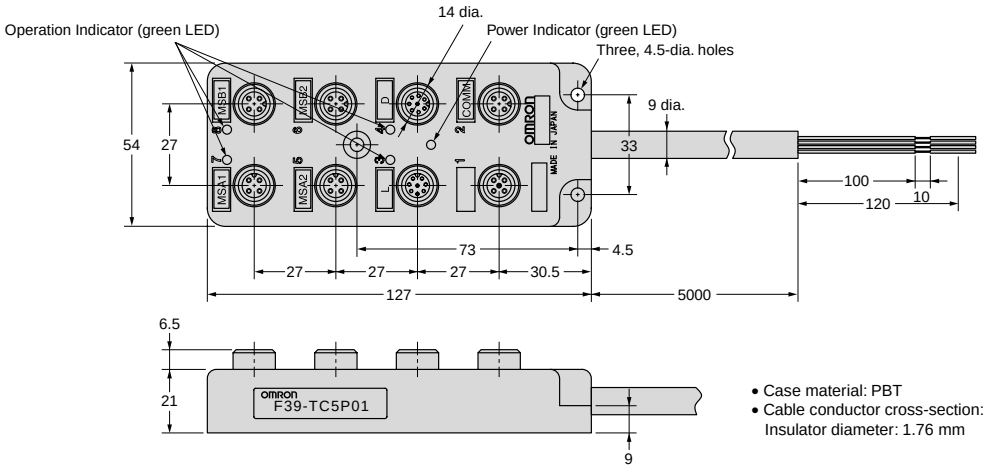
Model with Override Mode F39-TC5N02



Dimensions

(Unit: mm)

F39-TC5P01
F39-TC5P02
F39-TC5N01
F39-TC5N02



- Case material: PBT
- Cable conductor cross-section: 0.34 mm^2
  Insulator diameter: 1.76 mm

Safety Precautions

⚠ WARNING

The muting and override functions disable equipment safety functions. Use separate procedures to ensure safety when the muting and override functions are operating.

Position the Muting Sensors so that a distinction can be made between the entry of an object or a human. If the muting function were to operate when a human passed through, it may cause serious injury.

Install a Muting Lamp where it can be seen from all work locations, so that workers can check the status of the muting and override functions.

Muting times must be precisely set according to the application by qualified personnel who have received appropriate training. In particular, if the muting time limit is to be set to infinity, the person who makes the setting must bear responsibility.

Use two independent input devices for the muting inputs.

Install the F3SJ, Muting Sensors, or a protective wall so that workers cannot enter hazardous areas while muting is in effect, and set muting times.

Install override switches where they can be seen from the hazardous area, and where they cannot be operated from within the hazardous area. Before starting an override, check to make sure that nobody is within the hazardous area.

Precautions for Safe Use

Installation Conditions

- Connector tightening torque: 0.39 to 0.49 N·m
- Panel mounting tightening torque: 0.6 to 0.8 N·m (use metric 4 screws)

Handling

- Make sure that the power is turned OFF before connecting or disconnecting the connector.
- Make sure that fasteners are tightened properly by hand. (0.39 to 0.49 N·m)
- The use of pliers may cause damage. If the screws are not tightened properly, the degree of protection may not be obtained, and the screws may come loose from vibration.
- If the cables are connected with the polarity reversed, the load will not operate, or the operation indicator will not light.
- Make sure that signal lines are always connected through a load.
- Use Sensors that meet the specifications.
- Do not pull on the connectors and cables. Doing so may damage the connector or break the cable.
- To avoid breaking the cable and damaging the connector, install them in a location where there is no danger of stepping on them. If you must install them in a location where they might be stepped on, place a protective cover on them.
- When installing the product, do not bend the cable where it is connected to the product.
- If you must bend the cable, make sure that the bend radius is greater than 60 mm.
- If you are not going to install Sensors and switches, place waterproof covers (XS2Z-22) on the connectors to protect the contact surface.

Storage

Observe the following points when storing the product for an extended period of time.

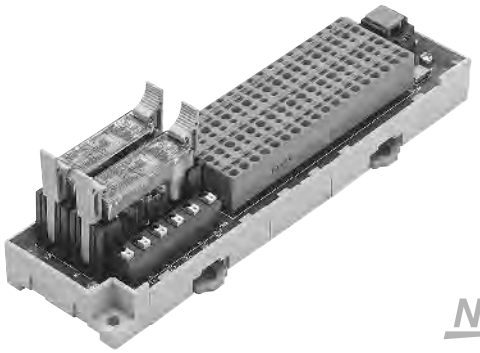
(1) Make sure that the storage location is well protected against dust and humidity.

(2) Do not store the product close to areas where ammonia or sulfurization gas is generated.

Safety Terminal Relays (for F3SJ-A□□□□P□□)

F3SP-T01

Simplifies wiring from Safety Light Curtains to the Safety Relay outputs.



Pending

NEW

- Simplifies wiring inside the panel and helps prevent incorrect wiring.
- Terminals are numbered to make it easy to check terminal connections.
- Replacement of relays is easy, improving maintainability.
- Screw-less clamp terminals eliminate the need for extra tightening.
- The Support Software can be connected, enabling on-site adjustment of Light Curtains.

⚠ Refer to *Safety Precautions* on page 21.

Ordering Information

Safety Terminal Relays

Type	Applicable models	Model
Safety Terminal Relay	F3SJ-A□□□□P□□	**F3SP-T01**

Optional Accessories (Sold Separately)

Type	Model
Cable for connecting Support Software (cable length: 1.5 m)	**E39-Z12-1**
Replacement Relay	**G7SA-3A1B**

Specifications (Refer to Instruction Manual for details.)

Ratings

Power supply

Rated voltage	24 VDC+15%/–10%
Rated power consumption	DC 1.7 W max. (not including sensor's power consumption)

Contacts

Rated load	250 VAC 3 A, resistive load 30 VDC 3 A, resistive load
Rated current	3 A
Applicable Relays	G7SA-3A1B: 24VDC

Characteristics

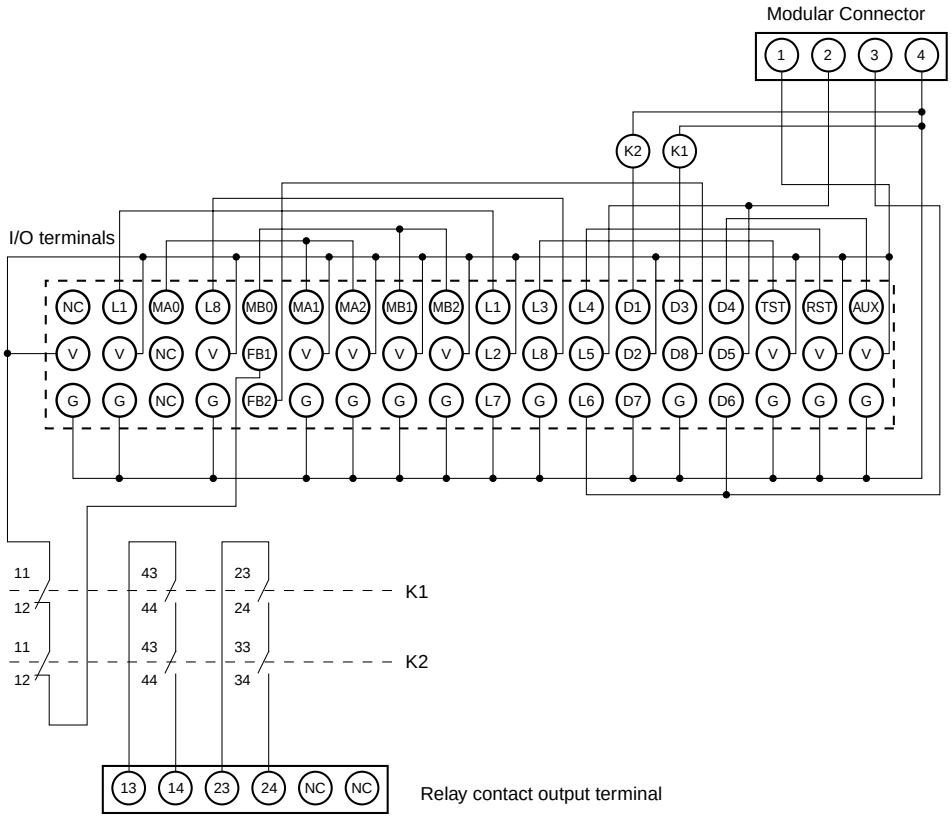
Operation time	100 ms max. (not including sensor's response time)
Response time	10 ms max. (not including sensor's response time)
Vibration resistance	10 to 55 to 10 Hz Single amplitude: 0.35 mm (Double amplitude: 0.7 mm)
Shock resistance	Destruction: 300 m/s^2, Malfunction: 100 m/s^2
Ambient operating temperature	–10 to 55°C
Ambient operating humidity	35 to 85%
Weight	Approx. 215 g

Durability

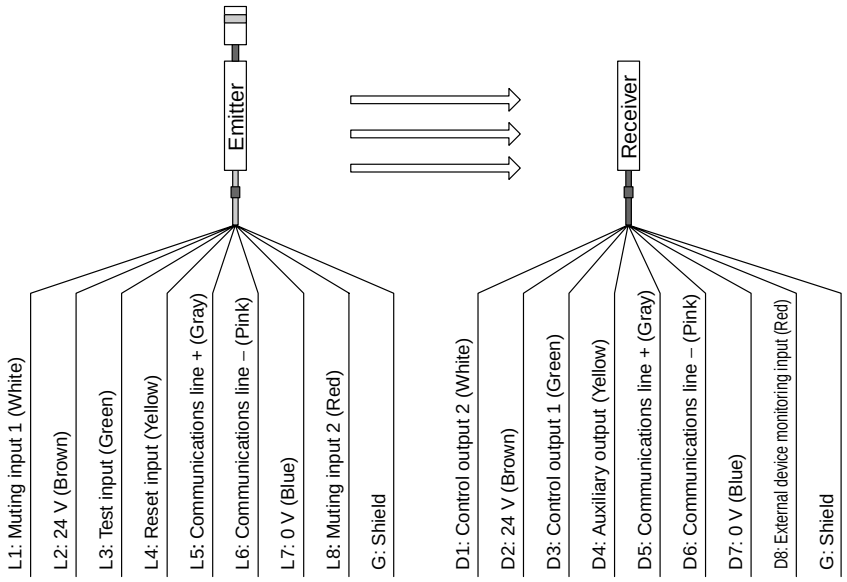
Electrical durability	100,000 operations min. Rated load Switching frequency: 1,800 operations/h
Mechanical durability	5,000,000 operations min. Switching frequency: 18,000 operations/h

Wiring Diagrams

Internal Circuit Diagrams

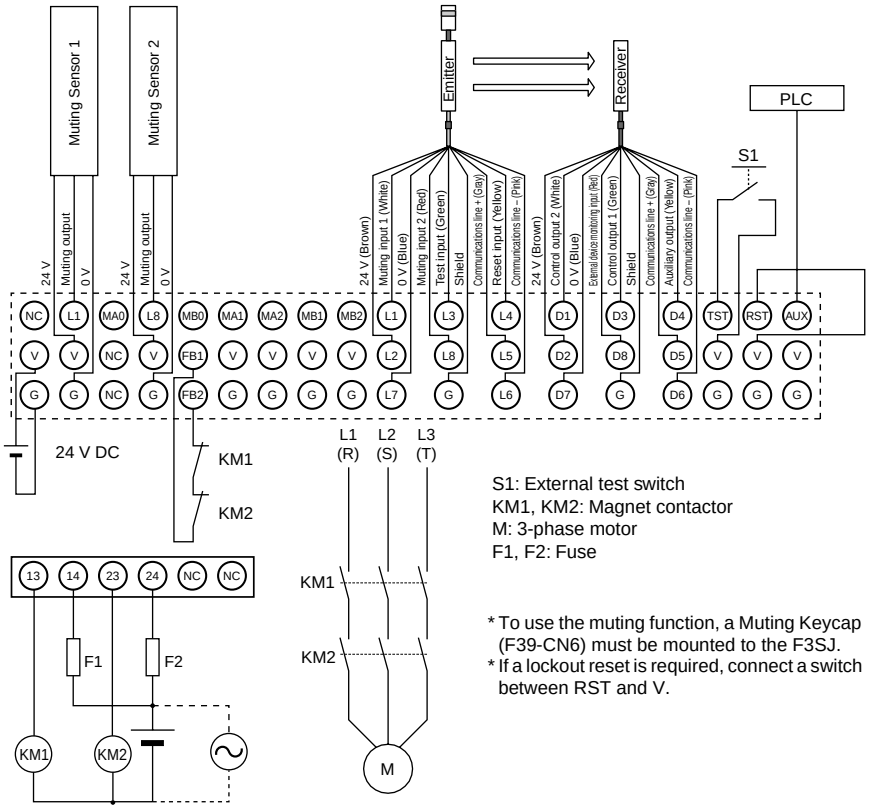


Wiring Diagrams



Wiring Example

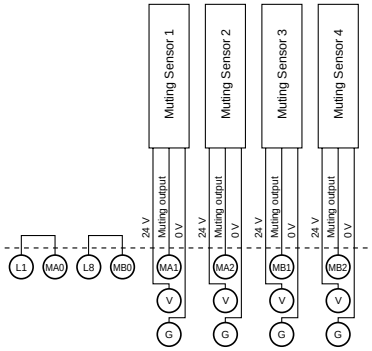
The following example is for when two muting sensors are connected in the auto reset mode, and the external device monitoring function is enabled.



S1: External test switch
KM1, KM2: Magnet contactor
M: 3-phase motor
F1, F2: Fuse

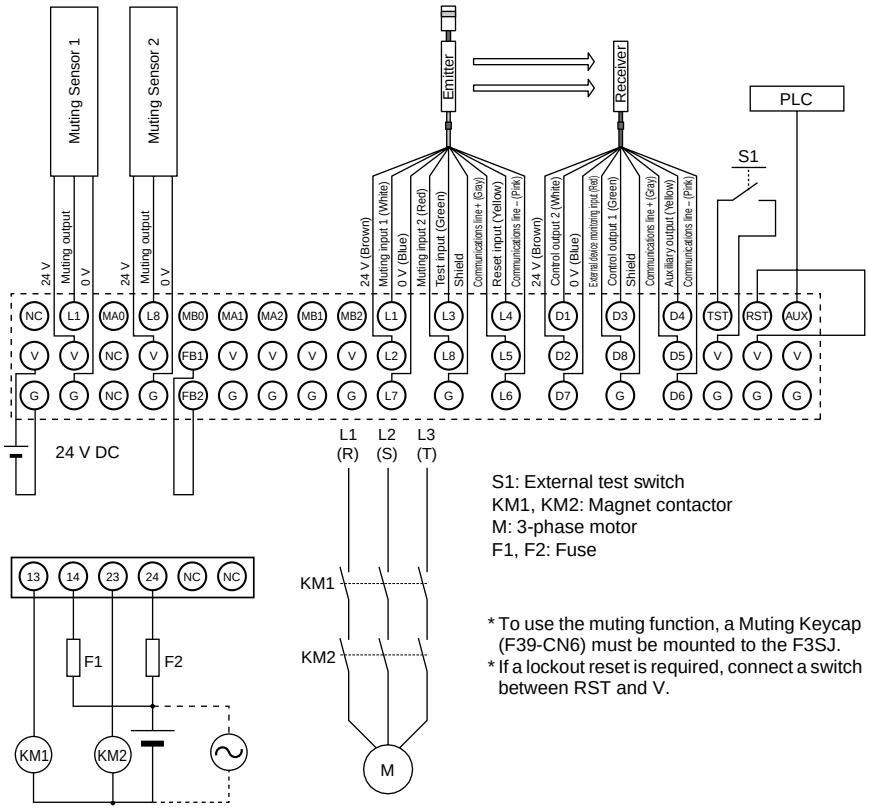
* To use the muting function, a Muting Keycap (F39-CN6) must be mounted to the F3SJ.
* If a lockout reset is required, connect a switch between RST and V.

Connecting Four Muting Sensors



Note: If you are connecting four muting sensors, connect the sensor outputs to MA1, MA2, MB1, and MB2. Also short-circuit MA0 to L1, and MB0 to L8.

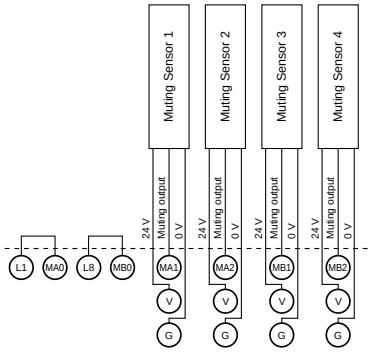
The following example is for when two muting sensors are connected in auto reset mode, and the external device monitoring function is disabled.



S1: External test switch
KM1, KM2: Magnet contactor
M: 3-phase motor
F1, F2: Fuse

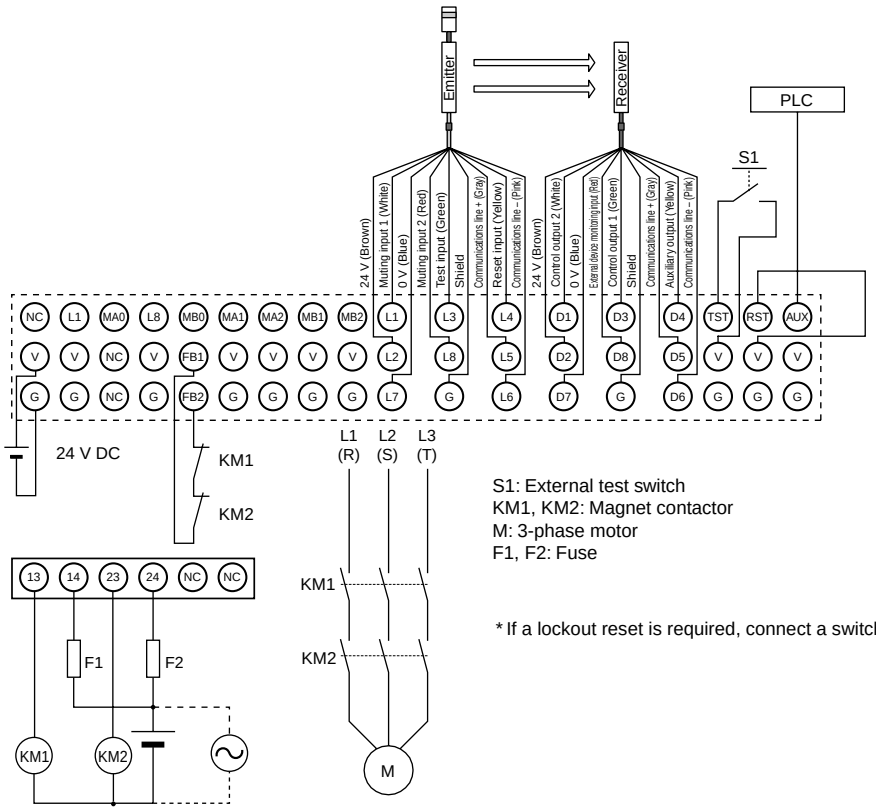
* To use the muting function, a Muting Keycap (F39-CN6) must be mounted to the F3SJ.
* If a lockout reset is required, connect a switch between RST and V.

Connecting Four Muting Sensors



Note: If you are connecting four muting sensors, connect the sensor outputs to MA1, MA2, MB1, and MB2. Also short-circuit MA0 to L1, and MB0 to L8.

The following example is for when no muting sensors are connected in the auto reset mode, and the external device monitoring function is enabled.



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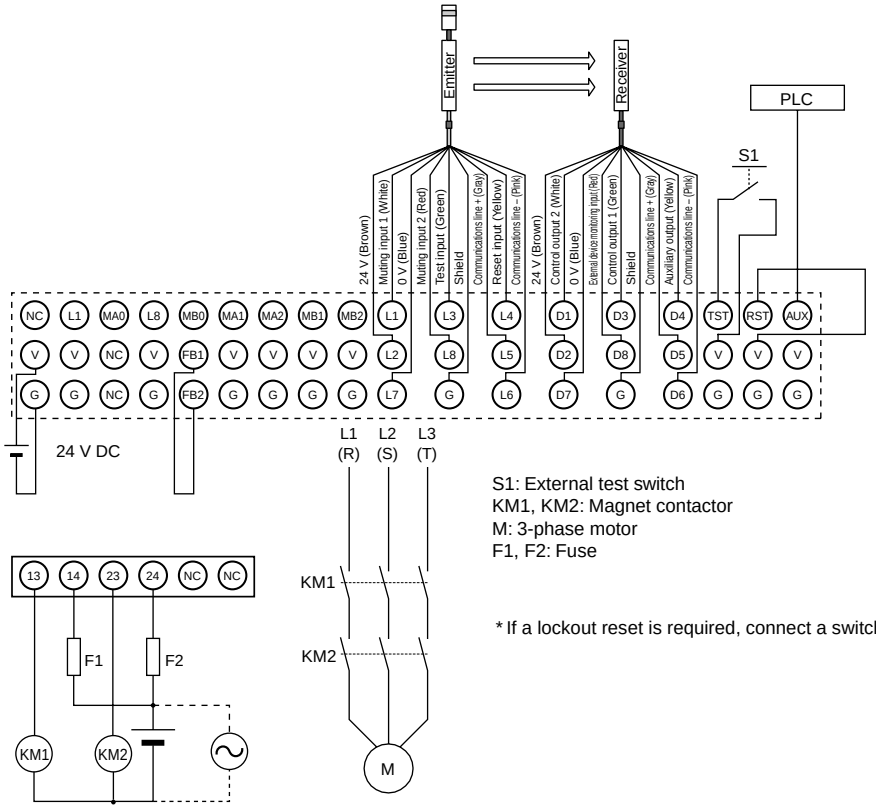
F1, F2: Fuse

* If a lockout reset is required, connect a switch between RST and V.

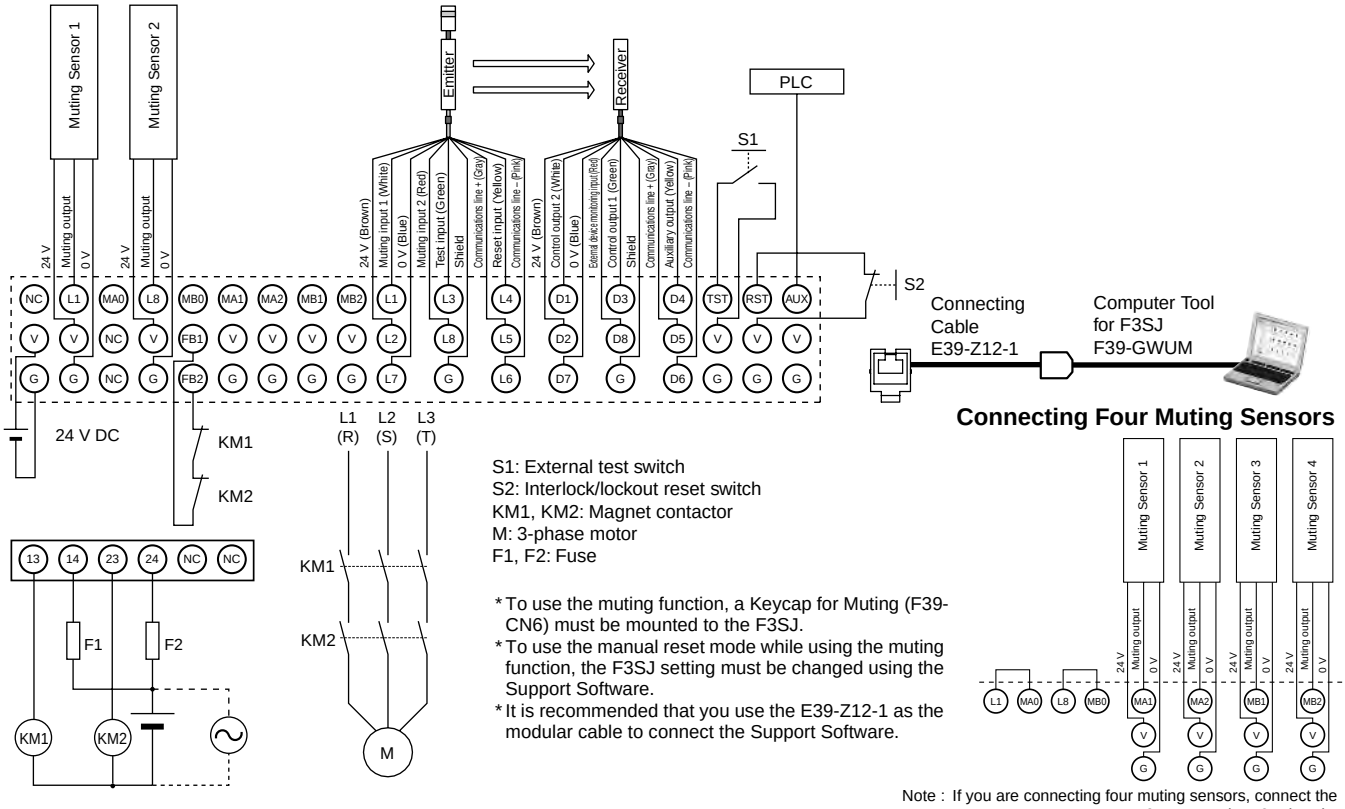
The following example is for when no muting sensors are connected in the auto rest mode, and the external device monitoring function is disabled.



S1: External test switch
KM1, KM2: Magnet contactor
M: 3-phase motor
F1, F2: Fuse

* If a lockout reset is required, connect a switch between RST and V.

The following example is for when two muting sensors are connected in the manual reset mode, and the external device monitoring function is enabled.



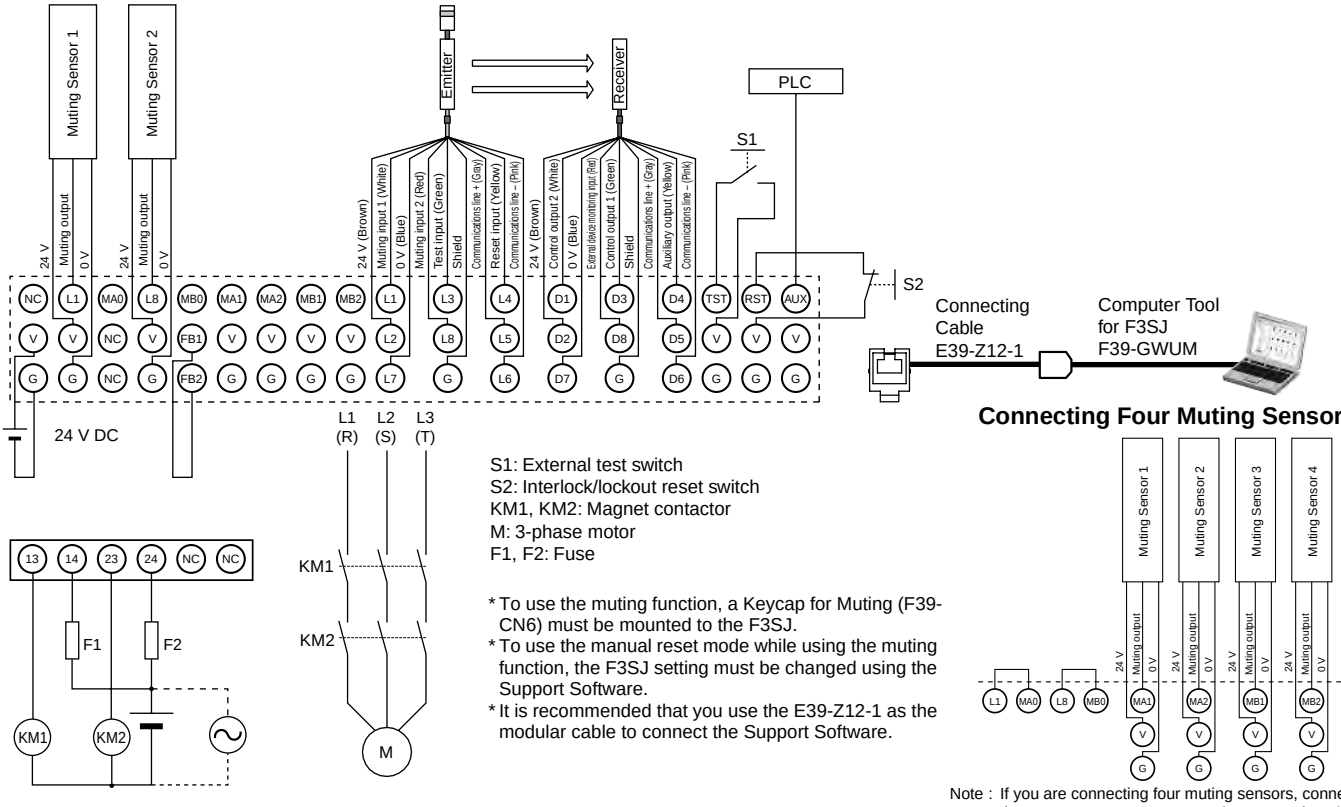
S1: External test switch
S2: Interlock/lockout reset switch
KM1, KM2: Magnet contactor
M: 3-phase motor
F1, F2: Fuse

* To use the muting function, a Keycap for Muting (F39-CN6) must be mounted to the F3SJ.
* To use the manual reset mode while using the muting function, the F3SJ setting must be changed using the Support Software.
* It is recommended that you use the E39-Z12-1 as the modular cable to connect the Support Software.

Connecting Four Muting Sensors

Note : If you are connecting four muting sensors, connect the sensor outputs to MA1, MA2, MB1, and MB2. Also short-circuit MA0 to L1, and MB0 to L8.

The following example is for when two muting sensors are connected in manual reset mode, and the external device monitoring function is disabled.



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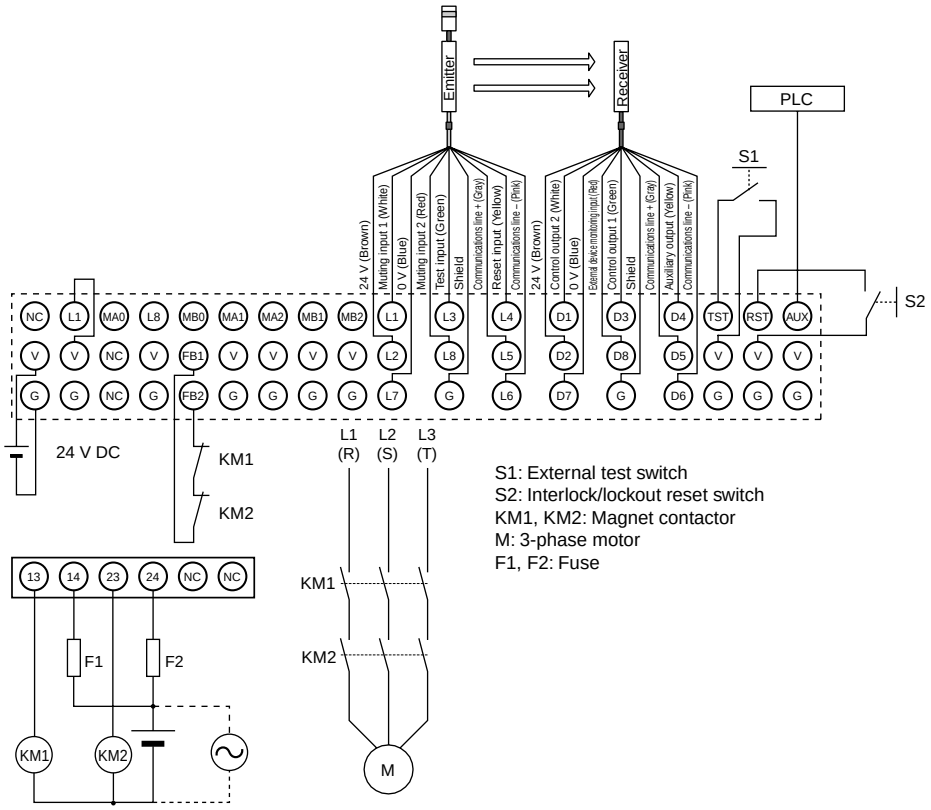

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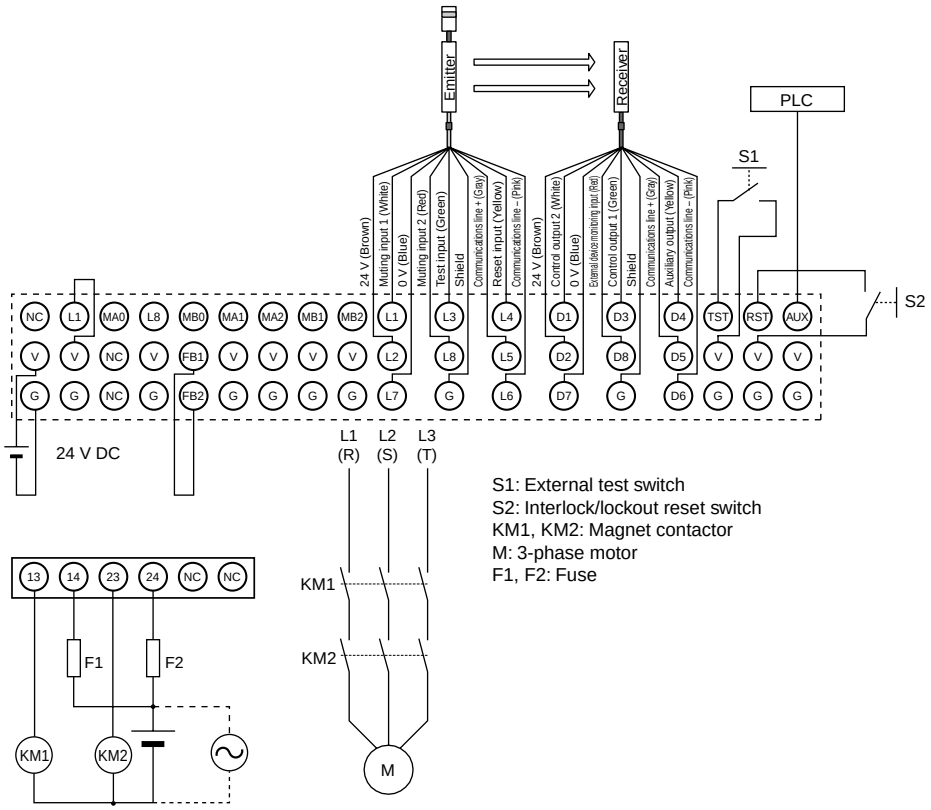
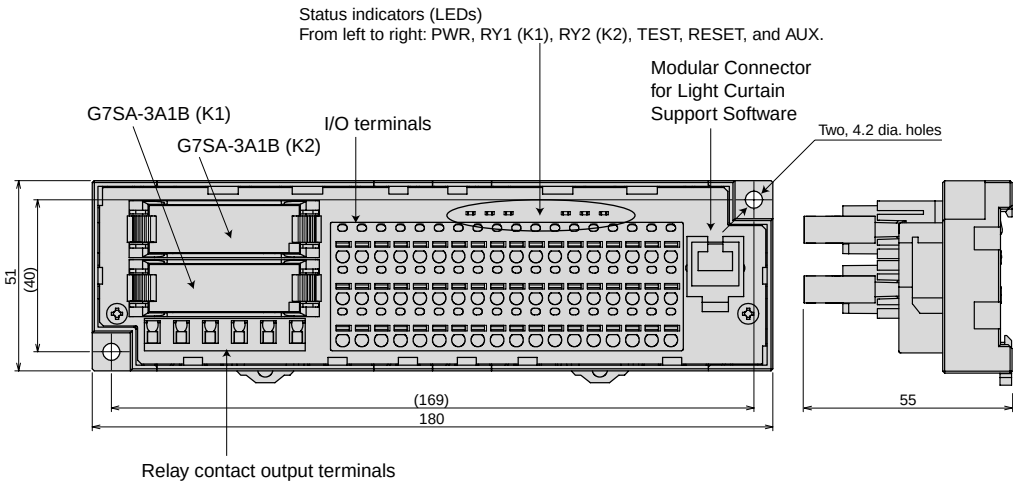


Dimensions

(Unit: mm)

F3SP-T01



Safety Precautions

⚠ WARNING

Do not operate the product in atmospheres containing flammable or explosive gas. Arcs or heating of relays during switching may cause fire or explosion.

Do not use a load that exceeds the contact ratings or switching capacity. Doing so may cause the product to fail to perform its specified functions, causing insulation failure, contact welding, or contact failure. It may also cause damage to the F3SP-T01 or burning.

The service life will depend on the switching conditions. Be sure to check the actual operating conditions using the actual devices, and make sure that the number of switching operations will not cause performance problems. If you continue to use the device with deteriorated performance, it may result in breakdown of insulation between circuits, or cause burning of the product.

Precautions for Safe Use

Handle with Care

Do not drop the product or expose it to excessive vibration or shock. Doing so may prevent it from functioning properly.

Adhesion of Solvent

Do not allow solvents, such as alcohol, thinner, trichloroethane, or gasoline, to come into contact with the product. Such solvents may make the markings illegible and cause deterioration of parts.

Installation Location

Do not install or store the product in the following locations. Doing so may result in product failure or malfunction.

- Locations subject to direct sunlight
- Locations subject to temperatures outside the range −10 to 55°C
- Locations subject to humidity levels outside the range 35% to 85%
- Locations subject to condensation due to extreme temperature changes
- Locations subject to atmospheric pressures outside the range 86 to 106 kPa
- Locations subject to corrosive or flammable gases
- Locations subject to shock or vibration in excess of the product ratings
- Locations subject to exposure to water, oil, or chemicals
- Locations subject to dust (including iron dust) or salts

Take appropriate and sufficient countermeasures when using the product in the following locations.

- Locations subject to static electricity or other forms of noise
- Locations subject to possible exposure to radioactivity
- Locations close to power supply lines

Installation

- Do not use products that have been dropped or have its internal parts disassembled. Specified characteristics may not be achieved, and may cause damage to the product or burning.
- If the products are installed side-by-side, the rated current is 1 A. Do not exceed 1 A.
- Use the F3SP-T01 in an enclosure that provides at least IP54 degree of protection.

Installation and Wiring

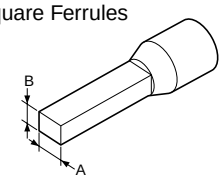
- Use the following electrical wiring for external I/O devices.

Solid wire	0.2 to 2.5 mm^2 AWG24 to 12
Flexible wires	0.34 to 1.5 mm^2, AWG22 to 16 If flexible wires are used, terminate the wires with insulated ferrules (DIN 46228-4 compatible type) before connecting them.

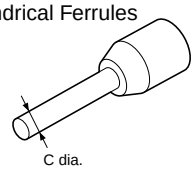
Compatible Ferrules

- Use ferrules that meet the following standards for length and width. If the standards are not met, connection may fail, or the ferrules may not be able to be plugged in and out of the terminals.
- Ferrule Dimensions (for Power Supply Terminal of F3SP-T01)

Square Ferrules



Cylindrical Ferrules



Square Ferrules	**Dimension A**	1.0 to 2.3	The cross-sectional area after crimping must be less than 4.8 mm^2.
	Dimension B	0.8 to 2.65	
Cylindrical Ferrules	**Dimension C**	0.8 dia. to 2.3 dia.	

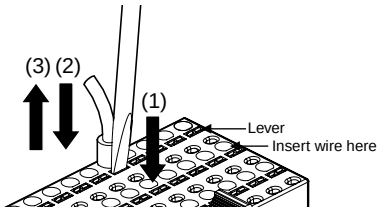
- Recommended Ferrule and Crimping Tool

Type of ferrule	Manufacturer	Size	Model	Recommended crimping tool
Square Ferrules	Phoenix Contact	AWG24	AI0.25-8YE	UD6 ZA3
		AWG22	AI0.34-8TQ	
		AWG20	AI0.5-10WH AI0.5-8WH	
		AWG18	AI0.75-10GY AI0.75-8GY	
		AWG16	AI1.5-10BK	
	Weidmuller	AWG24	H0.25/12	PZ6 roto
		AWG22	H0.34/12	
		AWG20	H0.5/16 H0.5/14	
		AWG18	H0.75/16 H0.75/14	
		AWG16	H1.5/16	
Cylindrical Ferrules	Nichifu	AWG22	TGV TC-1.25-11T TGN TC-1.25-11T	NH11 NH32 NH65
		AWG20		
		AWG18		
		AWG16		

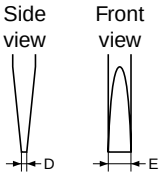
- Apply the specified voltages to the input terminals. Applying an inappropriate voltage may prevent specified functions from operating properly, which may cause damage to the product or burning.
- Disconnect the power supply before wiring.
- Check the condition of the emitter and receiver before connecting them.
- You cannot use the product if the positive side is connected to ground.
- NC terminals have no function. Do not connect them.

Wiring the Terminal Block

- Insert the wires using the following procedure.
  Flexible wires: (1) Use a flat-blade screwdriver to push in the lever and (2) insert the wire.
  Solid wires or ferrules: Insert the wire into the wire hole and push all the way to the back. (Operating the lever is not required.)
- Remove the wires using the following procedure (same for flexible wires, solid wires, and ferrules).
  (1) Use a flat-blade screwdriver to push in the lever and (3) pull out the wire.



- Use a flat-blade screwdriver that has the same thickness from tip to base and is within the following standards.



Dimension D	0.3 to 0.8
Dimension E	2.9 to 3.6

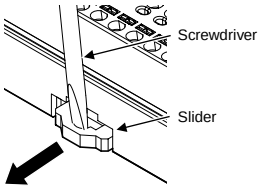
We recommend the following flat-blade screwdrivers for inserting wires.

Recommended Screwdrivers

Model
XW4Z-00B
XW4Z-00C

Mounting to and Removing from DIN Track

- To mount the product to a DIN Track, release the slider lock, place the product on the DIN track, and then lock the slider.
- After using the slider lock, make sure that the lock is engaged on the DIN Track.
- To dismount the product from the DIN Track, place the driver in the slider section, release the lock, and then remove the product from the DIN Track.
- Secure both ends of the Safety Terminal Relays with End Plates. The following products are sold separately.



DIN Tracks	PFP-50N PFP-100N
End Plate	PFP-M

Selecting the Power Supply

- Use the rated power supply voltage. Do not use power supplies with large ripple component or intermittent irregular voltages.
- To meet IEC 61496-1 and UL 508 safety standards and to prevent electrical shock, make sure that the power supply and load satisfy the requirements outlined in the sensor's user manual.

Periodic Checks and Maintenance

- Do not attempt to disassemble, repair, or modify the product.
- Make sure that the power supply is turned OFF before replacing parts.

Disposal

- Exercise caution to prevent injury when disassembling the F3SP-T01.

READ AND UNDERSTAND THIS CATALOG

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
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- Systems, machines, and equipment that could present a risk to life or property.

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