

# Safety Light Curtain

# F3SG-RA-02TS

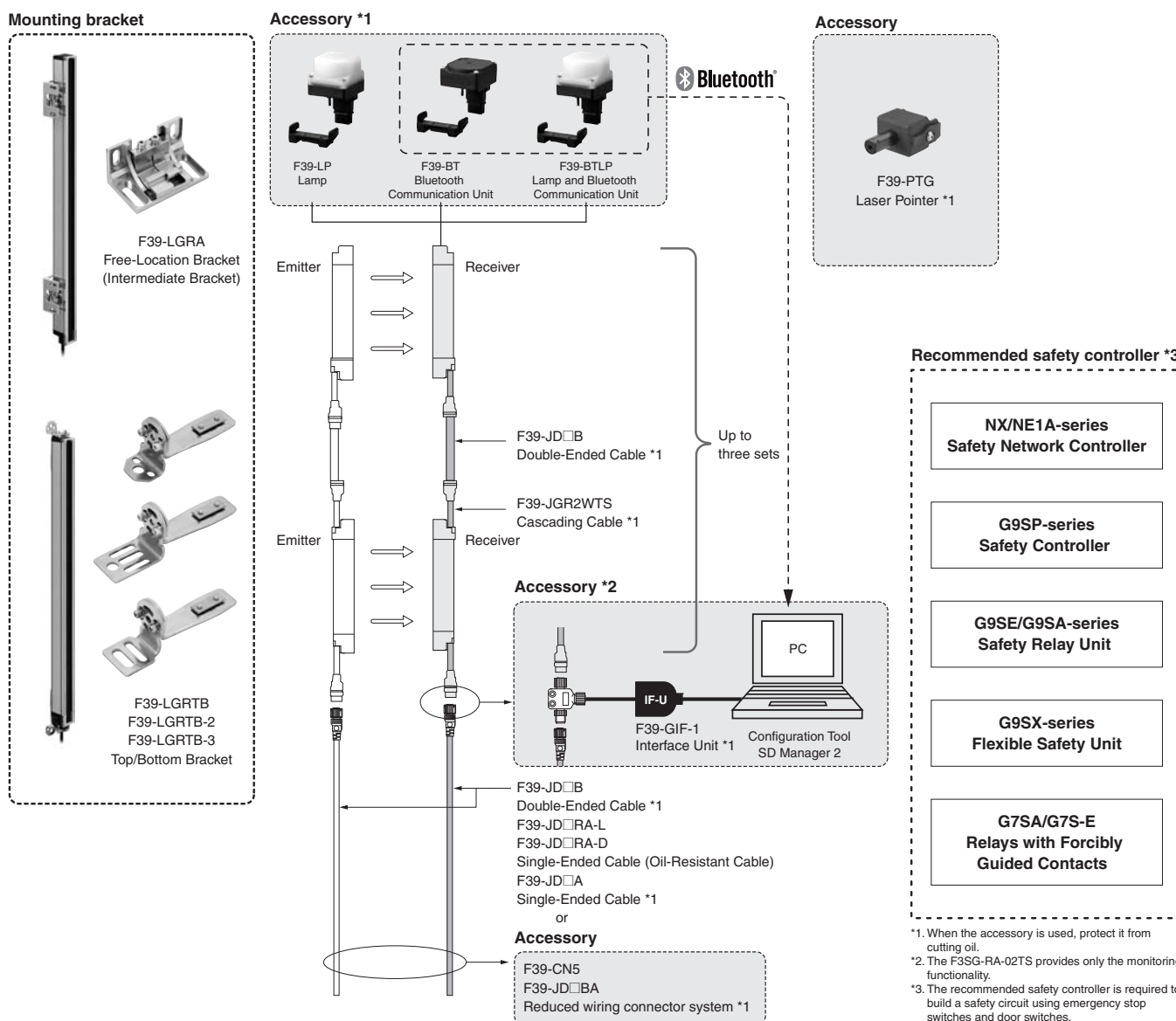
## Enhanced Cutting Oil Resistance

- Mechanical seal structure prevents cutting oil from getting inside
- Special materials and cables significantly enhanced oil resistance
- Rugged and compact housing. Perfect fit installation
- IP67G (JIS C 0920 Annex 1) rated
- Prevents accidental changes of settings by configuration tool (monitoring only)



**NEW**

## System Configuration



\*1. When the accessory is used, protect it from cutting oil.  
 \*2. The F3SG-RA-02TS provides only the monitoring functionality.  
 \*3. The recommended safety controller is required to build a safety circuit using emergency stop switches and door switches.

## Ordering Information

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### Main Units


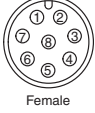
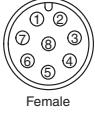
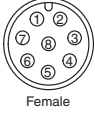
Safety Light Curtain

Hand and arm protection

Number of beams	Protective height (mm)	Model
12	240	F3SG-4RA0240-25-02TS
16	320	F3SG-4RA0320-25-02TS
20	400	F3SG-4RA0400-25-02TS
24	480	F3SG-4RA0480-25-02TS
28	560	F3SG-4RA0560-25-02TS
32	640	F3SG-4RA0640-25-02TS
36	720	F3SG-4RA0720-25-02TS
40	800	F3SG-4RA0800-25-02TS
44	880	F3SG-4RA0880-25-02TS
48	960	F3SG-4RA0960-25-02TS
52	1,040	F3SG-4RA1040-25-02TS
56	1,120	F3SG-4RA1120-25-02TS
60	1,200	F3SG-4RA1200-25-02TS
64	1,280	F3SG-4RA1280-25-02TS
68	1,360	F3SG-4RA1360-25-02TS
72	1,440	F3SG-4RA1440-25-02TS
76	1,520	F3SG-4RA1520-25-02TS
80	1,600	F3SG-4RA1600-25-02TS
84	1,680	F3SG-4RA1680-25-02TS
88	1,760	F3SG-4RA1760-25-02TS
92	1,840	F3SG-4RA1840-25-02TS
96	1,920	F3SG-4RA1920-25-02TS






## Accessories (Sold separately)

### Safety light curtain connecting cable Single-Ended Cable (Oil-Resistant Cable)

Appearance	Type	Cable length	Specifications	Model																								
	For emitter M12 connector (8-pin), 5 wires Color: Gray	3m	For emitter, M12 connector (8-pin), Color: Gray Connected to Power Cable or Double-Ended Cable  Female <table border="1"> <tr><td>1</td><td>-</td><td>Not used</td></tr> <tr><td>2</td><td>Brown</td><td>+24 VDC</td></tr> <tr><td>3</td><td>Black</td><td>TEST</td></tr> <tr><td>4</td><td>-</td><td>Not used</td></tr> <tr><td>5</td><td>Gray</td><td>Not used</td></tr> <tr><td>6</td><td>Pink</td><td>Not used</td></tr> <tr><td>7</td><td>Blue</td><td>0 VDC</td></tr> <tr><td>8</td><td>-</td><td>Not used</td></tr> </table>	1	-	Not used	2	Brown	+24 VDC	3	Black	TEST	4	-	Not used	5	Gray	Not used	6	Pink	Not used	7	Blue	0 VDC	8	-	Not used	F39-JD3RA-L
		1	-	Not used																								
	2	Brown	+24 VDC																									
	3	Black	TEST																									
4	-	Not used																										
5	Gray	Not used																										
6	Pink	Not used																										
7	Blue	0 VDC																										
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For receiver M12 connector (8-pin), 8 wires Color: Black	3m	For receiver, M12 connector (8-pin), Color: Black Connected to Power Cable or Double-Ended Cable  Female <table border="1"> <tr><td>1</td><td>White</td><td>OSSD 2</td></tr> <tr><td>2</td><td>Brown</td><td>+24 VDC</td></tr> <tr><td>3</td><td>Black</td><td>OSSD 1</td></tr> <tr><td>4</td><td>Yellow</td><td>AUX</td></tr> <tr><td>5</td><td>Gray</td><td>PC COM (+)</td></tr> <tr><td>6</td><td>Pink</td><td>PC COM (-)</td></tr> <tr><td>7</td><td>Blue</td><td>0 VDC</td></tr> <tr><td>8</td><td>Red</td><td>EDM</td></tr> </table>	1	White	OSSD 2	2	Brown	+24 VDC	3	Black	OSSD 1	4	Yellow	AUX	5	Gray	PC COM (+)	6	Pink	PC COM (-)	7	Blue	0 VDC	8	Red	EDM	F39-JD3RA-D	
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8	Red	EDM																										
7m	IP67 and IP67G (JIS C 0920 Annex 1)* rated when mated. * F3SG-RA-02TS meets the degree of protection when this cable is correctly connected with the power cable of the F3SG-RA-02TS. The degree of protection is not satisfied with the part where cable wires are uncovered.	F39-JD7RA-D																										

**Note:** To extend the cable length to more than 7 m, add the F39-JD□B Double-Ended Cable.  
When the Double-Ended Cable is used, protect it from cutting oil.

### Single-Ended Cable (2 cables per set, one for emitter and one for receiver) \*

Appearance	Cable length	Specifications	Model																								
	3m	For emitter M12 connector (8-pin), Color: Gray Connected to Power Cable or Double-Ended Cable  Female <table border="1"> <tr><td>1</td><td>White</td><td>Not used</td></tr> <tr><td>2</td><td>Brown</td><td>+24 VDC</td></tr> <tr><td>3</td><td>Black</td><td>TEST</td></tr> <tr><td>4</td><td>Yellow</td><td>Not used</td></tr> <tr><td>5</td><td>Gray</td><td>Not used</td></tr> <tr><td>6</td><td>Pink</td><td>Not used</td></tr> <tr><td>7</td><td>Blue</td><td>0 VDC</td></tr> <tr><td>8</td><td>Red</td><td>Not used</td></tr> </table>	1	White	Not used	2	Brown	+24 VDC	3	Black	TEST	4	Yellow	Not used	5	Gray	Not used	6	Pink	Not used	7	Blue	0 VDC	8	Red	Not used	F39-JD3A
	1	White	Not used																								
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	3	Black	TEST																								
	4	Yellow	Not used																								
5	Gray	Not used																									
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10m	For emitter M12 connector (8-pin), Color: Gray Connected to Power Cable or Double-Ended Cable  Female <table border="1"> <tr><td>1</td><td>White</td><td>Not used</td></tr> <tr><td>2</td><td>Brown</td><td>+24 VDC</td></tr> <tr><td>3</td><td>Black</td><td>TEST</td></tr> <tr><td>4</td><td>Yellow</td><td>Not used</td></tr> <tr><td>5</td><td>Gray</td><td>Not used</td></tr> <tr><td>6</td><td>Pink</td><td>Not used</td></tr> <tr><td>7</td><td>Blue</td><td>0 VDC</td></tr> <tr><td>8</td><td>Red</td><td>Not used</td></tr> </table>	1	White	Not used	2	Brown	+24 VDC	3	Black	TEST	4	Yellow	Not used	5	Gray	Not used	6	Pink	Not used	7	Blue	0 VDC	8	Red	Not used	F39-JD10A	
1	White	Not used																									
2	Brown	+24 VDC																									
3	Black	TEST																									
4	Yellow	Not used																									
5	Gray	Not used																									
6	Pink	Not used																									
7	Blue	0 VDC																									
8	Red	Not used																									
15m	For receiver M12 connector (8-pin), Color: Black Connected to Power Cable or Double-Ended Cable  Female <table border="1"> <tr><td>1</td><td>White</td><td>OSSD 2</td></tr> <tr><td>2</td><td>Brown</td><td>+24 VDC</td></tr> <tr><td>3</td><td>Black</td><td>OSSD 1</td></tr> <tr><td>4</td><td>Yellow</td><td>AUX</td></tr> <tr><td>5</td><td>Gray</td><td>PC COM (+)</td></tr> <tr><td>6</td><td>Pink</td><td>PC COM (-)</td></tr> <tr><td>7</td><td>Blue</td><td>0 VDC</td></tr> <tr><td>8</td><td>Red</td><td>EDM</td></tr> </table>	1	White	OSSD 2	2	Brown	+24 VDC	3	Black	OSSD 1	4	Yellow	AUX	5	Gray	PC COM (+)	6	Pink	PC COM (-)	7	Blue	0 VDC	8	Red	EDM	F39-JD15A	
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20m	IP67* rated when mated. * When the accessory is used, protect it from cutting oil.	F39-JD20A																									

\* The cable for emitter and the cable for receiver are available separately. Add '-L' for emitter or '-D' for receiver to the end of the model number when you order.

Single-Ended Cable for Emitter: F39-JD□A-L, Single-Ended Cable for Receiver: F39-JD□A-D

- Note:** 1. Use the F39-JD□RA-L/-D for applications where cutting oil resistance is required.  
2. To extend the cable length to more than 20 m, add the F39-JD□B Double-Ended Cable.

**Double-Ended Cable (2 cables per set, one for emitter and one for receiver) \***

Appearance	Cable length	Specifications	Model
	0.5m	For emitter M12 connector (8-pin), Color: Gray Connected to Power Cable or Double-Ended Cable Connected to Single-Ended Cable, or Double-Ended Cable	F39-JDR5B
	1m		F39-JD1B
	3m		F39-JD3B
	5m		F39-JD5B
	7m		F39-JD7B
	10m		F39-JD10B
	15m		F39-JD15B
	20m	IP67* rated when mated. * When the accessory is used, protect it from cutting oil.	F39-JD20B

\* The cable for emitter and the cable for receiver are available separately. Add '-L' for emitter or '-D' for receiver to the end of the model number when you order.

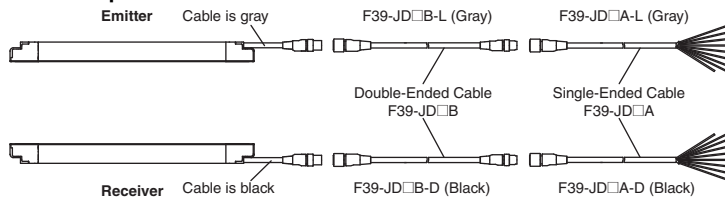
Double-Ended Cable for Emitter: F39-JD□B-L, Double-Ended Cable for Receiver: F39-JD□B-D

**Note:** To extend the cable length to more than 20 m, add the F39-JD□B Double-Ended Cable to the F39-JD□A Single-Ended Cable.

To extend the cable length to more than 40 m, add several Double-Ended Cables to the Single-Ended Cable.

Example: To extend the cable length to 50 m, connect two F39-JD20B (20 m) cables and one F39-JD10A (10 m) cable.

**<Connection example>**

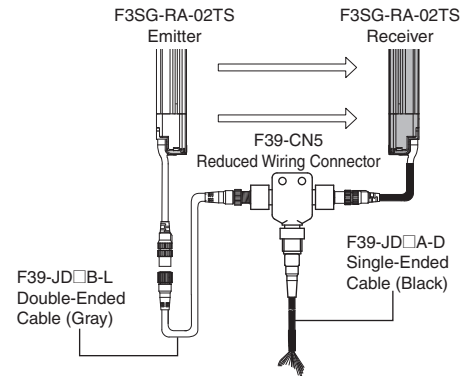


**Reduced Wiring Connector System (Order the F39-CN5 and Cables for Reduce Wiring.)**  
**Reduced Wiring Connector**

Appearance	Specifications	Model
	IP67* rated when mated. * When the accessory is used, protect it from cutting oil.	F39-CN5

**Note:** When using the Reduced Wiring Connector (F39-CN5), the following functions are not available.

- External Device Monitoring
- Auxiliary Output



**Cable for Reduce Wiring\* (2 cables per set, one for emitter and one for receiver)**


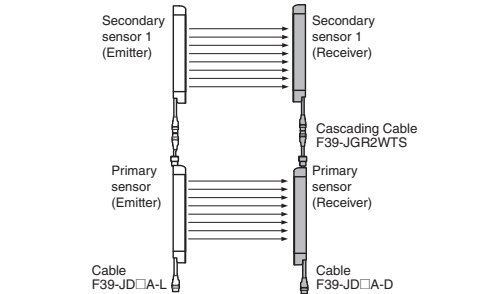
Appearance	Cable length	Specifications	Remarks	Model
	Emitter: 3 m Receiver: 3 m	IP67* rated when mated. * When the accessory is used, protect it from cutting oil.	Double-Ended Cable: F39-JD3B-L Single-Ended Cable: F39-JD3A-D	F39-JD0303BA
	Emitter: 3 m Receiver: 7 m		Double-Ended Cable: F39-JD3B-L Single-Ended Cable: F39-JD7A-D	F39-JD0307BA
	Emitter: 3 m Receiver: 10 m		Double-Ended Cable: F39-JD3B-L Single-Ended Cable: F39-JD10A-D	F39-JD0310BA
	Emitter: 5 m Receiver: 3 m		Double-Ended Cable: F39-JD5B-L Single-Ended Cable: F39-JD3A-D	F39-JD0503BA
	Emitter: 5 m Receiver: 7 m		Double-Ended Cable: F39-JD5B-L Single-Ended Cable: F39-JD7A-D	F39-JD0507BA
	Emitter: 5 m Receiver: 10m		Double-Ended Cable: F39-JD5B-L Single-Ended Cable: F39-JD10A-D	F39-JD0510BA
	Emitter: 10 m Receiver: 3 m		Double-Ended Cable: F39-JD10B-L Single-Ended Cable: F39-JD3A-D	F39-JD1003BA
	Emitter: 10 m Receiver: 7 m		Double-Ended Cable: F39-JD10B-L Single-Ended Cable: F39-JD7A-D	F39-JD1007BA
	Emitter: 10 m Receiver: 10 m		Double-Ended Cable: F39-JD10B-L Single-Ended Cable: F39-JD10A-D	F39-JD1010BA

**Note:** A combination of emitter and receiver cables of other lengths than the above is also available. For details, contact your Omron representative.

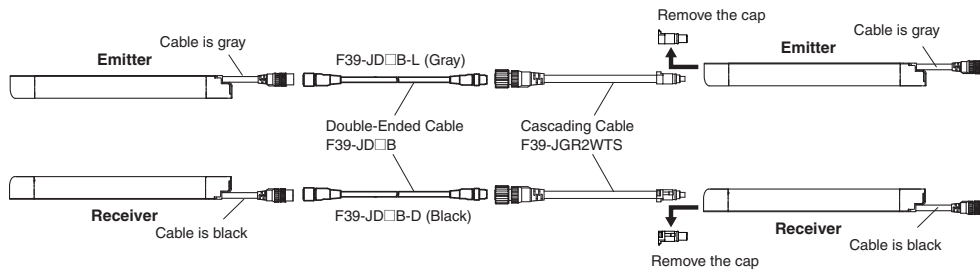
\* Double-Ended Cable for emitter and Single-Ended Cable for receiver.

# F3SG-RA-02TS





## Cascading Cable (2 cables per set, one for emitter and one for receiver)

Appearance	Type	Cable length	Specifications	Model
	Cap (8-pin), M12 connector (8-pin)	0.2m	 <p>IP67* rated when mated. * When the accessory is used, protect it from cutting oil.</p>	<b>F39-JGR2WTS</b>

**Note:** The Double-Ended Cable (up to 10 m: F39-JD10B) can be added to extend the cable length between the series-connected sensors. Cable length between sensors: 10 m max. (not including cascading cable (F39-JGR2WTS) and power cable)



## Sensor Mounting Brackets




Appearance	Specifications	Application	Model
	Free-Location Bracket (Intermediate Bracket)	Beam alignment after mounting possible. The angle adjustment range is $\pm 15^\circ$ . Side mounting and backside mounting possible. (Sold separately as a set of 2 brackets. Refer to note *1 for the number of sets required for each model.)	<b>F39-LGRA</b>
	Top/Bottom Bracket *2	Use this bracket at the top and bottom positions of the F3SG-RA-02TS. Beam alignment after mounting possible. The angle adjustment range is $\pm 22.5^\circ$ . Side mounting and backside mounting possible. (Sold separately as a set of 4 brackets.)	<b>F39-LGRTB</b>
	Top/Bottom Bracket *2	The part of this bracket to contact with a wall surface has a different shape from the F39-LGRTB Top/Bottom Bracket. Use this bracket when replacing an existing safety light curtain with the F3SG-RA-02TS. (Sold separately as a set of 4 brackets.)	<b>F39-LGRTB-2</b>
	Top/Bottom Bracket *2	Select a bracket that fit into the existing mounting hole.	<b>F39-LGRTB-3</b>

\*1. Protective height of 0240 to 1200 mm: 2 sets, Protective height of 1280 to 1920 mm: 3 sets

\*2. Use the Top/Bottom Bracket in combination with the Intermediate Bracket.

Protective height of 1040 or less: The Intermediate Bracket is not required. Please purchase 1 set of Top/Bottom Brackets (F39-LGRTB(-2/-3)). Protective height of 1120 to 1920: Please purchase 1 set of Top/Bottom Brackets (F39-LGRTB(-2/-3)) and 1 set of Intermediate Brackets (F39-LGRA).


**Interface units and configuration tool SD Manager 2 \*1 \*2**

Appearance	Type	Specifications	Model
	SD Manager 2	The Configuration Tool SD Manager 2 is available to download from our website at <a href="http://www.ia.omron.com/f3sg-r_tool">http://www.ia.omron.com/f3sg-r_tool</a>	-
	Interface Unit	F39-GIF-1 interface unit to connect the F3SG-RA-02TS receiver to a USB port of the PC  Accessories: F39-CN1 Branch Connector (1), Connector Cap (1), 2-m Dedicated Cable (1), Instruction Manual	F39-GIF-1
	Bluetooth Communication Unit	F39-BT bluetooth unit to enable bluetooth on the F3SG-RA  IP67 rated when mated.	F39-BT

\*1. The F3SG-RA-02TS provides only the monitoring functionality.


\*2. When the accessory is used, protect it from cutting oil.

**Lamp \***

Appearance	Type	Specifications	Model
	Lamp	The lamp can be connected to a receiver and turned ON based on the operation of F3SG-RA. The lamp output pattern is set as follows: Red (ON): Inverted signal of safety output information Orange (Blink once): Inverted signal of stable-state information	F39-LP
	Lamp and Bluetooth Communication Unit	Green (ON): Safety output information  IP67 rated when mated.	F39-BTLP

\* When the accessory is used, protect it from cutting oil.


**End Cap \*1 \*2**

Appearance	Specifications	Model
	Housing color: Black For both emitter and receiver (Attached to the F3SG-RA-02TS. The End Cap can be purchased if lost.)  IP67 rated when mated.	F39-CNM

\*1. This accessory can also be used with the F3SG-RA-01TS.

\*2. When the accessory is used, protect it from cutting oil.

**Laser Pointer for F3SG-R \***

Appearance	Specifications	Model
	The laser pointer is attached on the optical surface of the F3SG-R to help coarse adjustment of beams.	F39-PTG

\* When the accessory is used, protect it from cutting oil.

**Test Rod**

Diameter	Model
25 mm dia.	F39-TRD25

# F3SG-RA-02TS

## Ratings and Specifications

### Main unit

The □□□□ in the model names indicate the protective heights in millimeters.

		F3SG-4RA□□□□-25-02TS		
Performance	<b>Object Resolution (Detection Capability)</b>	Opaque objects 25-mm dia.		
	<b>Beam Gap</b>	20 mm		
	<b>Number of Beams</b>	12 to 96		
	<b>Lens Size</b>	6.0 × 5.0 (W × H) mm		
	<b>Protective Height</b>	240 to 1920 mm		
	<b>Operating Range</b>	0.3 to 17.0 m		
	<b>Response Time</b>	<b>ON to OFF</b>	Normal mode: 8 to 13 ms *1	
		<b>OFF to ON</b>	Normal mode: 40 to 90ms (synchronized), 140 to 190ms (not synchronized) *1	
			*1. Response time when used in one segment system or in cascaded connection. Refer to page 128 for the one segment system. Refer to <i>Safety Light Curtain F3SG-4RA□□□□-25-02TS Series User's Manual (ManNo.: Z391)</i> for cascaded connection.	
	<b>Effective Aperture Angle (EAA) (IEC 61496-2)</b>	±2.5° max., emitter and receiver at operating range of 3 m or greater		
<b>Light Source</b>	Infrared LEDs, Wavelength: 870 nm			
<b>Startup Waiting Time</b>	2 s max.			
Electrical	<b>Power Supply Voltage (Vs)</b>	SELV/PELV 24 VDC±20% (ripple p-p 10% max.)		
	<b>Current Consumption</b>	Refer to page 128 .		
	<b>Safety Outputs (OSSD)</b>	Two PNP transistor outputs Load current of 300 mA max., Residual voltage of 2 V max. (except for voltage drop due to cable extension), Capacitive load of 1 μF max., Inductive load of 2.2 H max. *1 Leakage current of 1 mA max.		
		*1. 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. *2. These values must be taken into consideration when connecting elements including a capacitive load such as a capacitor.		
	<b>Auxiliary Output</b>	One PNP transistor output Load current of 100 mA max., Residual voltage of 2 V max .		
	<b>Output Operation Mode</b>	<b>Safety Output</b>	Light-ON (Safety output is enabled when the receiver receives an emitting signal.)	
		<b>Auxiliary Output</b>	Reverse output of safety output	
	<b>Input Voltage</b>	<b>External device monitoring input (Lockout reset input)</b>	ON voltage: Vs-3 V to Vs (short circuit current: approx. 6.5 mA) * OFF voltage: 0 V to 1/2 Vs, or open (short circuit current: approx. 8.0 mA) *	
		<b>Test input</b>	24 V Active setting: ON voltage: 9 V to Vs (short circuit current: approx. 2.5 mA) * OFF voltage: 0 V to 1.5 V or open (short circuit current: approx. 2.0 mA) 0 V Active setting: ON voltage: 0 V to 3 V (short circuit current: approx. 2.0 mA) OFF voltage: 9 V to Vs or open (short circuit current: approx. 2.5 mA) *	
			* The Vs indicates a supply voltage value in your environment.	
<b>Overvoltage Category (IEC 60664-1)</b>	II			
<b>Indicators</b>	Refer to page 130.			
<b>Protective Circuit</b>	Output short protection, Power supply reverse polarity protection			
<b>Insulation Resistance</b>	20 MΩ or higher (500 VDC megger)			
<b>Dielectric Strength</b>	1,000 VAC, 50/60 Hz (1 min)			
Functional	<b>Mutual Interference Prevention (Scan Code)</b>	This function prevents mutual interference in up to two F3SG-RA-25-02TS systems.		
	<b>Cascade Connection</b>	Number of cascaded segments: 3 max. (only among F3SG-4RA□□□□-25-02TS's)		
		Total number of beams: 255 max. Cable length between sensors: 10 m max. (not including cascading cable (F39-JGR2WTS) and power cable)		
	<b>Test Function</b>	Self-test (at power-on, and during operation) External test (light emission stop function by test input)		
<b>Safety-Related Functions</b>	External device monitoring (EDM) Scan code selection			
Environmental	<b>Ambient Temperature</b>	<b>Operating</b>	-10 to 55°C (14 to 131°F) (non-icing)	
		<b>Storage</b>	-25 to 70°C (-13 to 158°F)	
	<b>Ambient Humidity</b>	<b>Operating</b>	35% to 85% (non-condensing)	
		<b>Storage</b>	35% to 95%	
	<b>Ambient Illuminance</b>	Incandescent lamp: 3,000 lx max. on receiver surface Sunlight: 10,000 lx max. on receiver surface		
	<b>Degree of Protection (IEC 60529)</b>	IEC 60529: IP65 and IP67, JIS C 0920 Annex 1: IP67G		
	<b>Vibration Resistance (IEC 61496-1)</b>	10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps for all 3 axes		
<b>Shock Resistance (IEC 61496-1)</b>	100 m/s <sup>2</sup> , 1000 shocks for all 3 axes			
<b>Pollution Degree (IEC 60664-1)</b>	Pollution Degree 3			

			F3SG-4RA□□□□-25-02TS
Connections	Power cable	Type of Connection	M12 connectors: 8-pin emitter and receiver. Cables prewired to the sensors. IP67 and IP67G (JIS C 0920 Annex 1) * rated when mated. * F3SG-RA-25-02TS meets the degree of protection when it is correctly connected with an F39-JD□□RA-□ Oil-Resistant extension cable.
		Number of Wires	Emitter: 5, Receiver: 8
		Cable Length	0.3 m
		Cable Diameter	6 mm
		Minimum Bending Radius	R36 mm
	Cascading cable	Type of Connection	M12 connectors: 8-pin emitter and receiver. IP67 rated when mated.
		Number of Wires	Emitter: 5, Receiver: 8
		Cable Length	0.3 m
		Minimum Bending Radius	R5 mm
	F39-JD□RA-□ Oil-Resistant cable - Single-Ended Cable	Type of Connection	M12 connectors: 8-pin emitter and receiver. Cables prewired to the sensors. IP67 and IP67G (JIS C 0920 Annex 1)* rated when mated. * F3SG-RA-25-02TS meets the degree of protection when it is correctly connected with the power cable. The degree of protection is not satisfied with the part where cable wires are uncovered.
		Number of Wires	Emitter: 5, Receiver: 8
		Cable Length	Refer to page 122.
		Cable Diameter	6 mm
		Minimum Bending Radius	R36 mm
	Extension cable - Single-Ended Cable (F39-JD□A) - Double-Ended Cable (F39-JD□B)	Type of Connection	M12 connectors: 8-pin emitter and receiver. IP67 rated when mated.
Number of Wires		Emitter: 8, Receiver: 8	
Cable Length		Refer to page 122 and 123.	
Minimum Bending Radius		R36 mm	
Extension of Power Cable		100 m max. (Emitter/Receiver)	
Material	Material	Housing: Aluminum alloy Cap: PBT resin Front window: Acrylic resin Cable: Fluororesin FE plate: Stainless steel	
	Weight	Refer to page 128 .	
	Included Accessories	Safety Precautions, Quick Installation Manual, Troubleshooting Guide Sticker, End Cap (for switching External Test Input function)	
Conformity	Conforming standards	Refer to page 129.	
	Performance Level (PL)/Safety category	PL e/Category 4 (EN ISO 13849-1:2015)	
	PFH <sub>d</sub>	1.1 × 10 <sup>-8</sup> (IEC 61508)	
	Proof test interval T <sub>M</sub>	Every 20 years (IEC 61508)	
	SFF	99% (IEC 61508)	
	HFT	1 (IEC 61508)	
Classification		Type B (IEC 61508-2)	

## Bluetooth Communication Unit

Communication System	Bluetooth Version 3.0
Communication Profile	SPP (Serial Port Profile)
Transmission Distance	Approx. 10 m max. (Output power: Class 2) *

\* It depends on use environment conditions.



# F3SG-RA-02TS

## List of Models/Response Time/Current Consumption/Weight

Model	Number of Beams	Protective Height [mm] (Overall length)	Response Time [ms] *1			Current Consumption [mA]		Weight [kg]	
			ON → OFF *2	OFF (Synchronized) → ON	OFF (Not synchronized) → ON	Emitter	Receiver	Net *3	Gross *4
F3SG-4RA0240-25-02TS	12	240	8	40	140	35	75	0.7	1.6
F3SG-4RA0320-25-02TS	16	320	8	40	140	40	75	0.9	1.9
F3SG-4RA0400-25-02TS	20	400	8	40	140	45	75	1.1	2.1
F3SG-4RA0480-25-02TS	24	480	8	40	140	50	75	1.3	2.4
F3SG-4RA0560-25-02TS	28	560	8	40	140	50	75	1.5	2.7
F3SG-4RA0640-25-02TS	32	640	8	40	140	55	75	1.7	3.0
F3SG-4RA0720-25-02TS	36	720	8	40	140	60	80	1.9	3.2
F3SG-4RA0800-25-02TS	40	800	8	40	140	65	80	2.1	3.5
F3SG-4RA0880-25-02TS	44	880	13	65	165	50	80	2.3	3.8
F3SG-4RA0960-25-02TS	48	960	13	65	165	50	80	2.5	4.0
F3SG-4RA1040-25-02TS	52	1040	13	65	165	55	80	2.7	4.3
F3SG-4RA1120-25-02TS	56	1120	13	65	165	55	85	2.9	4.6
F3SG-4RA1200-25-02TS	60	1200	13	65	165	55	85	3.1	4.9
F3SG-4RA1280-25-02TS	64	1280	13	65	165	60	85	3.3	5.1
F3SG-4RA1360-25-02TS	68	1360	13	65	165	60	85	3.5	5.4
F3SG-4RA1440-25-02TS	72	1440	13	65	165	65	85	3.7	5.7
F3SG-4RA1520-25-02TS	76	1520	13	65	165	65	90	3.9	5.9
F3SG-4RA1600-25-02TS	80	1600	13	65	165	70	90	4.1	6.2
F3SG-4RA1680-25-02TS	84	1680	13	65	165	70	90	4.3	6.5
F3SG-4RA1760-25-02TS	88	1760	13	65	165	70	90	4.5	6.7
F3SG-4RA1840-25-02TS	92	1840	13	65	165	75	90	4.7	7.0
F3SG-4RA1920-25-02TS	96	1920	13	65	165	75	95	4.9	7.3

\*1. The maximum speed of movement of a test rod up to which the detection capability is maintained is 2.0 m/s.

\*2. The response times are values when Scan Code is set at Code B. The response times for Code A are 1 ms shorter than these values.

\*3. The net weight is the weight of an emitter and a receiver.

\*4. The gross weight is the weight of an emitter, a receiver, included accessories and a package.

## Legislation and Standards

1. The F3SG-RA-02TS does not receive type approval provided by Article 44-2 of the Industrial Safety and Health Act of Japan. When using the F3SG-RA-02TS in Japan as a "safety system for pressing or shearing machines" prescribed in Article 42 of that law, the machine control system must receive type approval.
2. The F3SG-RA-02TS is electro-sensitive protective equipment (ESPE) in accordance with European Union (EU) Machinery Directive Index Annex V, Item 2.
3. EC/EU Declaration of Conformity  
OMRON declares that the F3SG-RA-02TS is in conformity with the requirements of the following EC/EU Directives:  
Machinery Directive 2006/42/EC  
EMC Directive 2014/30/EU
4. Conforming Standards
  - (1) European 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)
  - (2) International standards  
IEC61496-1 (Type 4 ESPE), IEC61496-2 (Type 4 AOPD), IEC61508-1 through -4 (SIL 3), ISO 13849-1:2015 (PL e, Category 4)
  - (3) JIS standards  
JIS B 9704-1 (Type 4 ESPE), JIS B 9704-2 (Type 4 AOPD)
  - (4) North American standards  
UL61496-1 (Type 4 ESPE), UL61496-2 (Type 4 AOPD), UL508, UL1998, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8
5. Third-Party Certifications
  - (1) TÜV SÜD
    - EC Type-Examination certificate:  
EU Machinery Directive, Type 4 ESPE (EN61496-1), Type 4 AOPD (EN 61496-2)
    - Certificate:  
Type 4 ESPE (EN61496-1), Type 4 AOPD (EN61496-2), EN 61508-1 through -4 (SIL 3), EN ISO 13849-1:2015 (PL e, Category 4)
  - (2) UL
    - UL Listing:  
Type 4 and ESPE (UL61496-1), Type 4 AOPD (UL61496-2), UL508, UL1998, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8
6. Other Standards  
The F3SG-RA-02TS is designed according to the standards listed below. To make sure that the final system complies with the following standards and regulations, you are asked to design and use it in accordance with all other related standards, laws, and regulations. If you have any questions, consult with specialized organizations such as the body responsible for prescribing and/or enforcing machinery safety regulations in the location where the equipment is to be used.
  - European Standards: EN415-4, EN691-1, EN692, EN693, IEC 62046
  - U.S. Occupational Safety and Health Standards: OSHA 29 CFR 1910.212
  - U.S. Occupational Safety and Health Standards: OSHA 29 CFR 1910.217
  - American National Standards: ANSI B11.1 to B11.19
  - American National Standards: ANSI/RIA R15.06
  - Canadian Standards Association CSA Z142, Z432, Z434
  - SEMI Standards SEMI S2
  - Japan Ministry of Health, Labour and Welfare "Guidelines for Comprehensive Safety Standards of Machinery", Standard Bureau's Notification No. 0731001 dated July 31, 2007.rms and Conditions Agreement

# F3SG-RA-02TS

## Indicator

### Emitter

Name of Indicator		Color	Illuminated	Blinking
Test	TEST	Green	–	External Test is being performed
Operating range	LONG	Green	Always illuminated	Lockout state due to Scan code setting error
Power	POWER	Green	Power is ON.	Error due to noise
Lockout	LOCKOUT	Red	–	Lockout state due to error in emitter

### Receiver

Name of Indicator		Color	Illuminated	Blinking
Top-beam-state	TOP	Blue	The top beam is unblocked	Lockout state due to Cap error or Other sensor error
PNP/NPN mode	NPN	Green	Always illuminated	–
Configuration	CFG	Green	–	Lockout state due to Parameter error or Cascading Configuration error
External device monitoring	EDM	Green	EDM input is in ON state *	Lockout state due to EDM error
Internal error	INTERNAL	Red	–	Lockout state due to Internal error, or error due to abnormal power supply or noise
Lockout	LOCKOUT	Red	–	Lockout state due to error in receiver
Stable-state	STB	Green	Incident light level is 170% or higher of ON-threshold	Safety output is instantaneously turned OFF due to ambient light or vibration
ON/OFF	ON/OFF	Green	Safety output is in ON state	–
		Red	Safety output is in OFF state	Lockout state due to Safety Output error, or error due to abnormal power supply or noise
Communication	COM	Green	Synchronization between emitter and receiver is maintained	Lockout state due to Communication error, or error due to abnormal power supply or noise
Bottom-beam state	BTM	Blue	The bottom beam is unblocked	Lockout state due to Scan code setting error

**Note:** TOP, CFG, LOCKOUT, STB and ON/OFF indicators are illuminated when the receiver of the F3SG-RA-02TS is in Setting mode.

\* The EDM indicator is illuminated when the EDM input is in the ON state regardless of the use of the EDM function.

### Interface Unit

<b>Main Unit</b>	PC/AT compatible machine (computer that runs Microsoft Windows)
<b>Operating System (OS)</b>	Windows 7 (32-bit/64-bit), Windows 8, 8.1 (32-bit/64-bit), Windows 10 (32-bit/64-bit)
<b>Communication Port</b>	USB port x1
<b>Ambient Temperature</b>	Operating: -10 to 55°C, Storage: -30 to 70°C (non-icing and non-condensing)
<b>Ambient Humidity</b>	Operating: 35% to 85%, Storage: 35% to 95% (non-condensing)

### Lamp

Item	F39-LP
<b>Applicable Sensor</b>	F3SG-□RA Series Safety Light Curtain (Receiver)
<b>LED Light Color</b>	Red/Green/Orange
<b>Power Supply Voltage</b>	24 VDC±20%, ripple p-p 10% max. (shares sensor's power supply)
<b>Current Consumption</b>	25 mA max. (shares sensor's power supply.)
<b>Ambient Temperature</b>	Operating: -10 to 55°C, Storage: -25 to 70°C
<b>Ambient Humidity</b>	Operating: 35% to 85%, Storage: 35% to 95%
<b>Vibration Resistance</b>	10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps for all 3 axes
<b>Shock Resistance</b>	100 m/s <sup>2</sup> , 1000 shocks for all 3 axes
<b>Degree of Protection</b>	IP65 and IP67 (When attached to F3SG)
<b>Type of Connection</b>	Connectable to F3SG-RA's terminal connector
<b>Material</b>	Lighting element: PC, Other body parts: PBT
<b>Weight</b>	45 g (when packaged)

## Connections (Basic Wiring Diagram)

### Standalone F3SG-RA-02TS

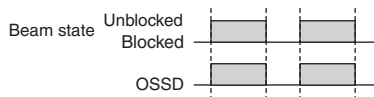
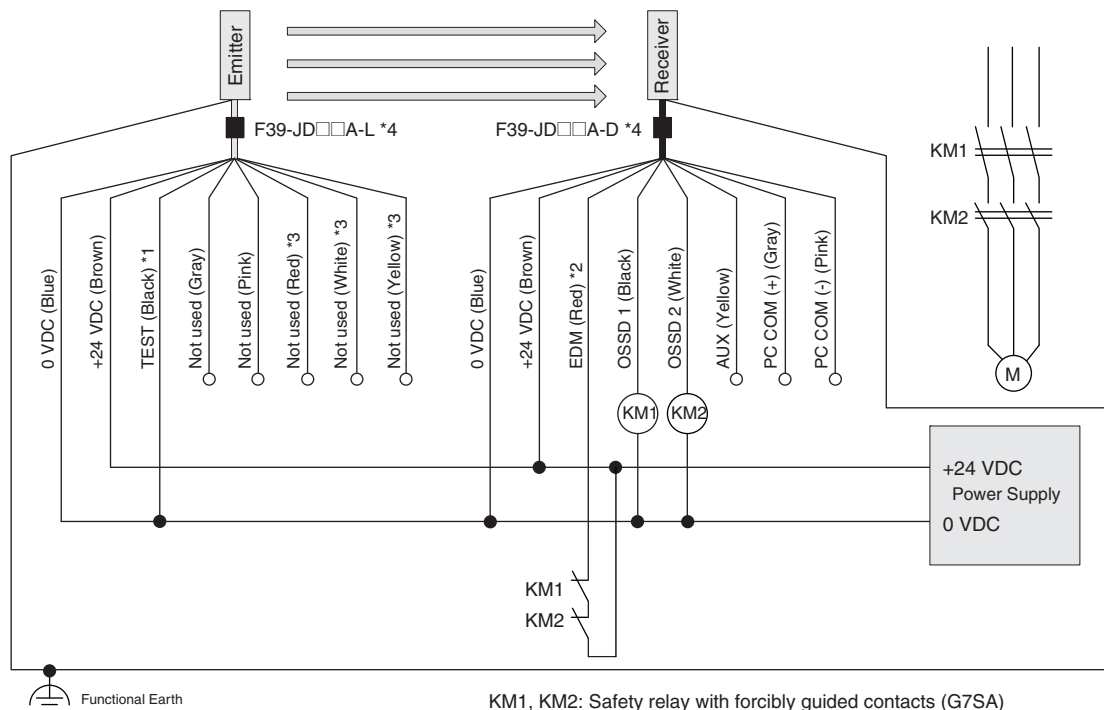
#### EDM used and External Test in 24V Active not used

The following is the example of External Device Monitoring used and External Test in 24 V Active not used.

#### Settings

	Function
Receiver	EDM
Emitter	External Test: 24 V Active (End Cap: Black) (factory default setting)

#### Wiring Example



KM1, KM2: Safety relay with forcibly guided contacts (G7SA)  
M: Motor

- \*1. Connect the line to 24 V via a test switch (N.O. contact) if External Test is used.
- \*2. Connect a lockout reset switch (N.C. contact) to this line in series with the KM1 and KM2 if Lockout Reset is used.
- \*3. The F39-JD□□RA-L Single-Ended Cable for Emitter (Oil-Resistant Cable) does not have the red, white and yellow wires.
- \*4. For the F39-JD□□A-□ Single-Ended Cable, connect the shield line to 0 V.

**Note:** Functional earth connection is unnecessary when you use the F3SG-RA-02TS in a general industrial environment where noise control or stable power supply is considered. However, when you use the F3SG-RA-02TS in an environment where there may be excessive noise from surroundings or stable power supply may be interfered, it is recommended the F3SG-RA-02TS be connected to functional earth.

The wiring examples in later examples do not indicate functional earth. To use functional earth, wire an earth cable according to the example above. Refer to *Safety Light Curtain F3SG-RA-02TS Series User's Manual* for more information.

## Connectable Safety Control Units

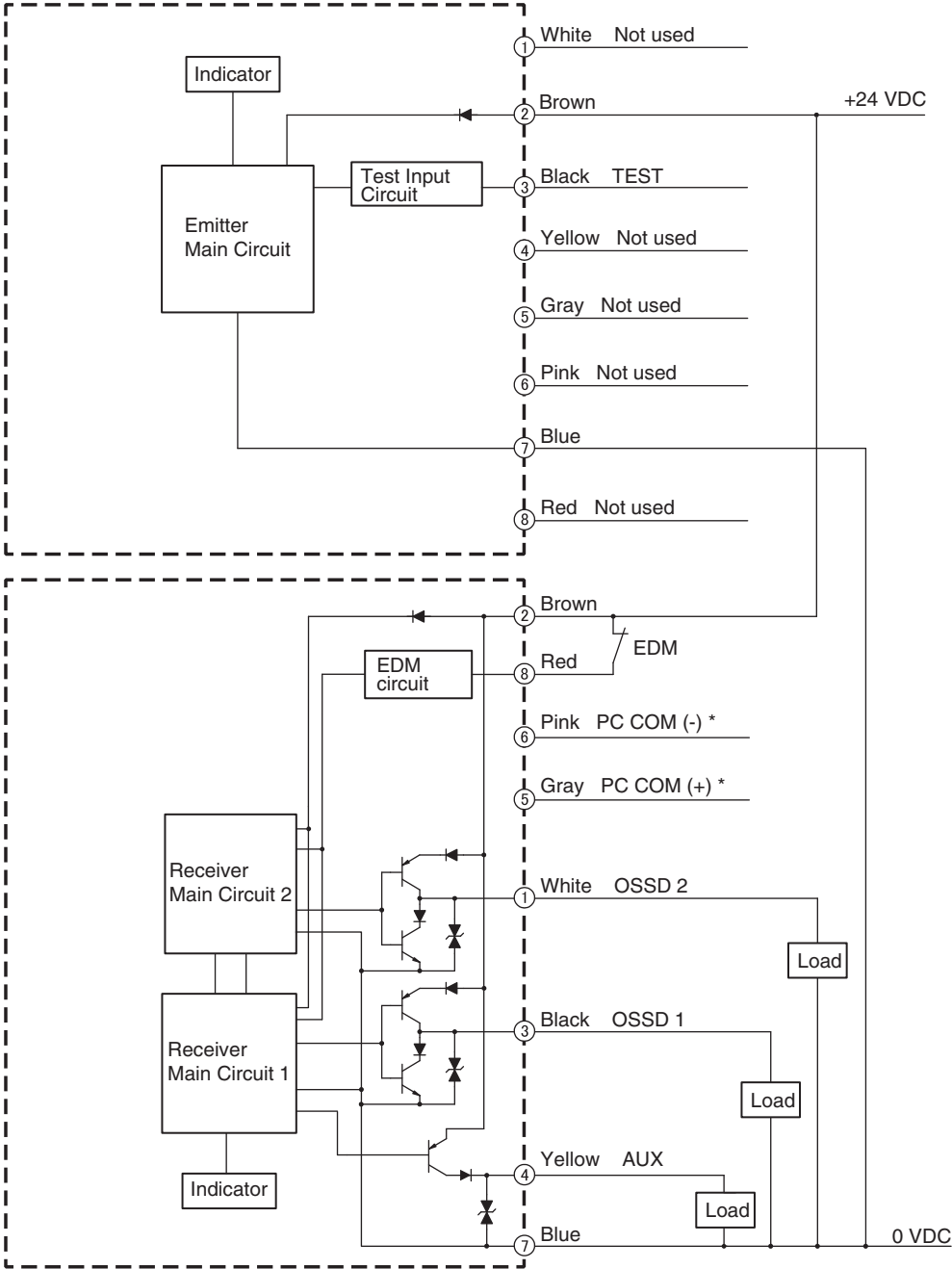
The F3SG-RA-02TS can be connected to the safety control units listed in the table below.

Connectable Safety Control Units		
Safety Relay Units	Flexible Safety Units	Safety Controllers
G9SA-301		G9SP-N10S
G9SA-321-T□		G9SP-N10D
G9SA-501		G9SP-N20S
G9SB-200-B	G9SX-AD322-T	NE0A-SCPU01
G9SB-200-D	G9SX-ADA222-T	NE1A-SCPU01
G9SB-301-B	G9SX-BC202	NE1A-SCPU02
G9SB-301-D	G9SX-GS226-T15	DST1-ID12SL-1
G9SE-201		DST1-MD16SL-1
G9SE-401		DST1-MRD08SL-1
G9SE-221-T□		NX-SIH400
		NX-SID800
		F3SP-T01

# Input/Output Circuit

## Entire Circuit Diagram

The entire circuit diagram of the F3SG-RA-02TS is shown below. The numbers in the circles indicate the connector's pin numbers.



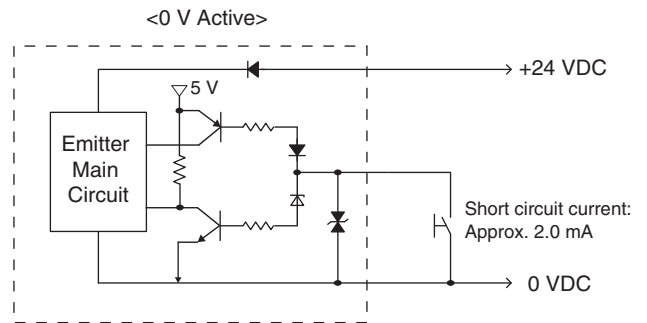
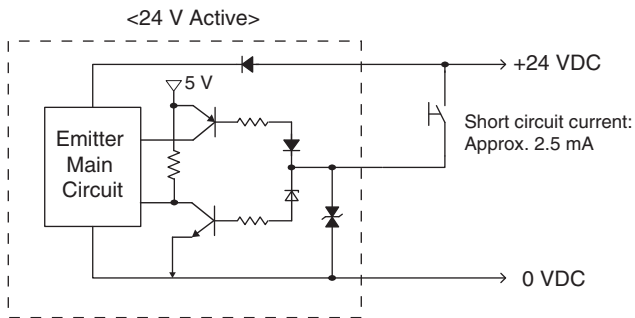
\* This line is used for communication with a PC using the F39-GIF-1 Interface Unit.

F3SG-RA-02TS

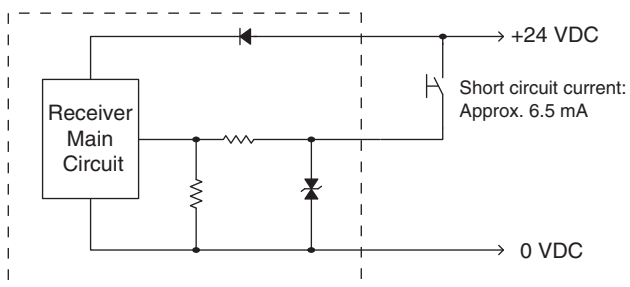
## Input Circuit Diagram by Function

The input circuit diagrams of by function are shown below.

### Test Input

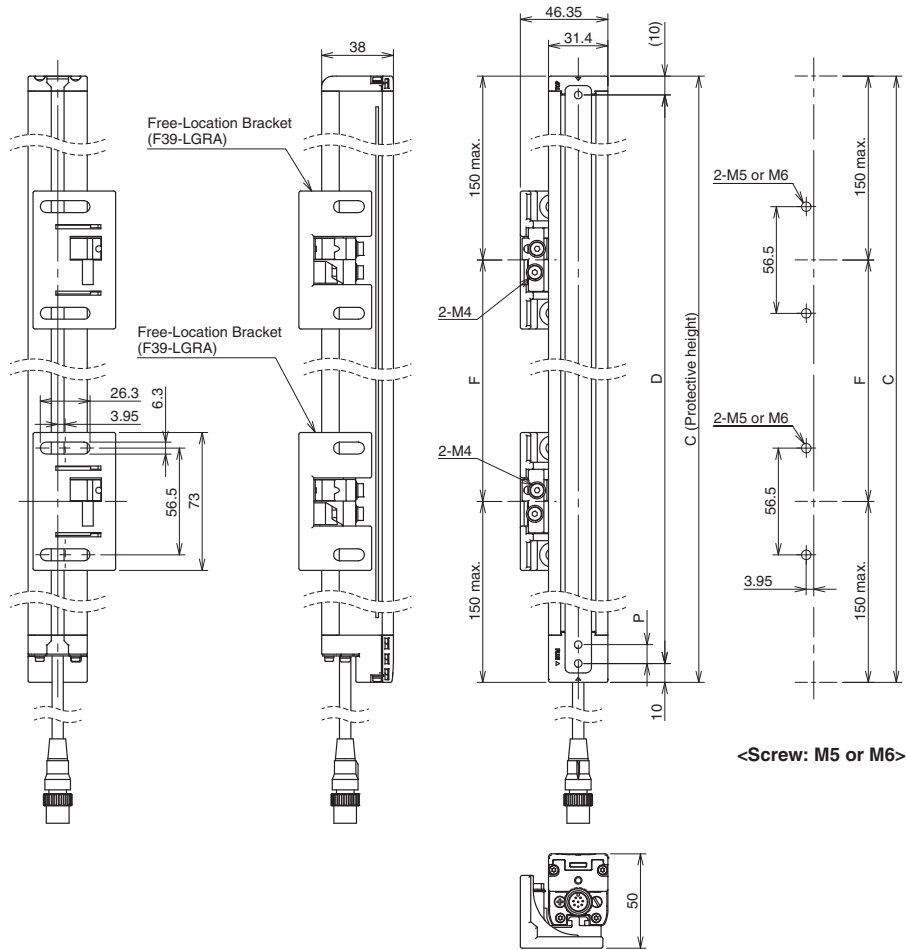


### EDM



# Dimensions

## Mounted with Free-Location Brackets (F39-LGRA) Backside Mounting



### F3SG-4RA-□□□□-25-02TS Series

Dimension C	4-digit number of the type name (Protective height)
Dimension D	C-20
Dimension P	20

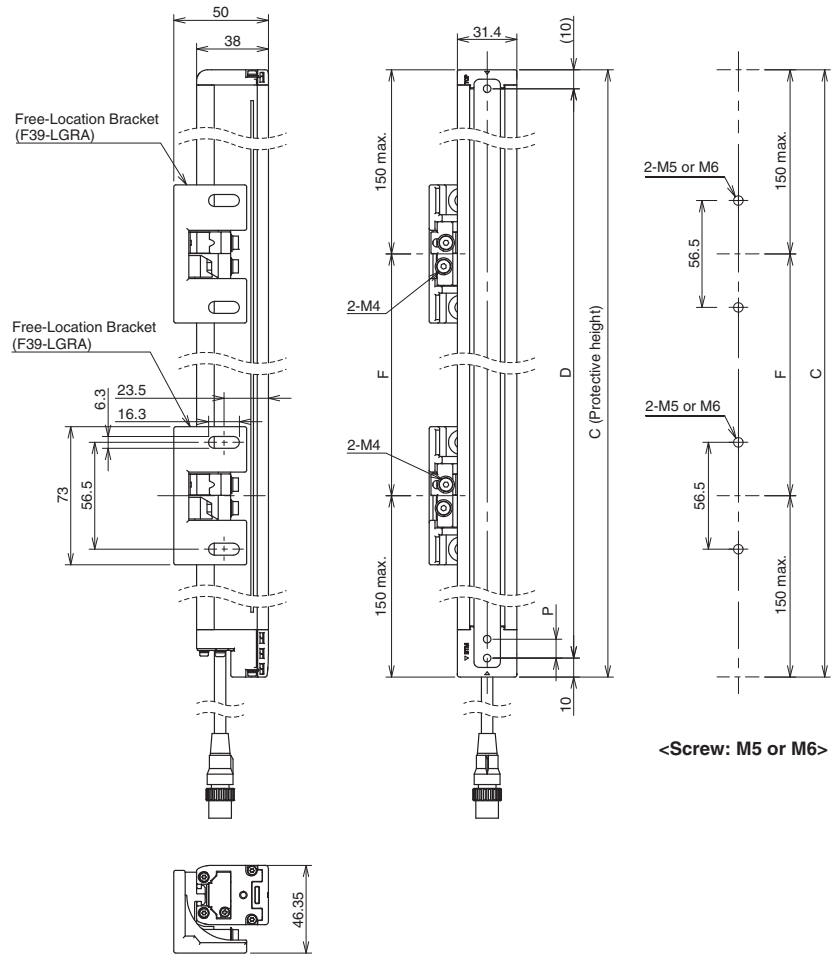
Protective height (C)	Number of Free-Location Brackets *1	Dimension F
0240 to 1200	2 *2	1000 mm max.
1280 to 1920	3	1000 mm max.

\*1. The number of brackets required to mount either one of emitter and receiver.

\*2. Mounting an emitter or receiver with one bracket is possible for the model of protective height of 0240. In this case, locate this bracket at half the Dimension C (or at the center of the sensor length).



## Side Mounting



### F3SG-4RA-□□□□-25-02TS Series

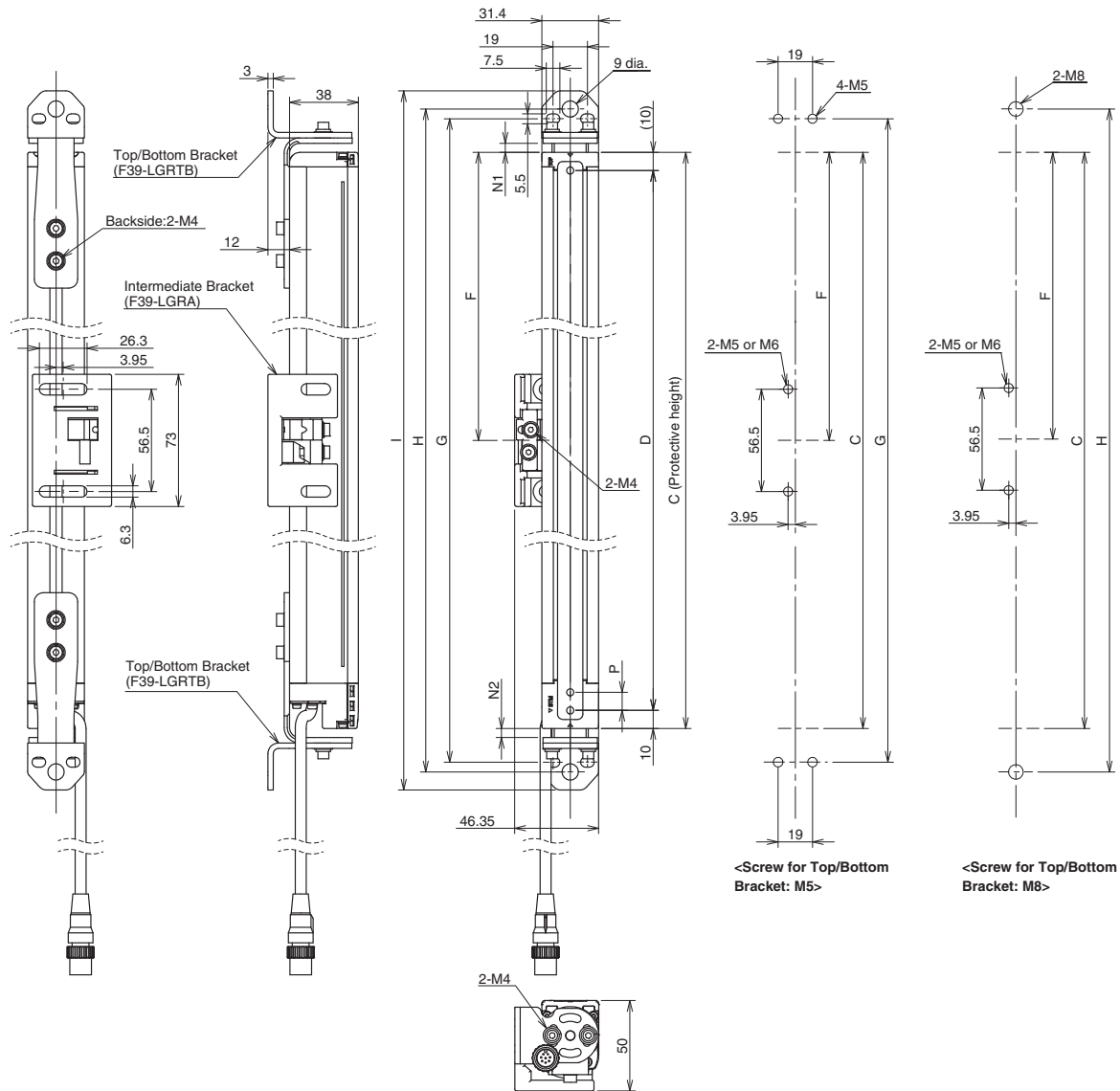
<b>Dimension C</b>	4-digit number of the type name (Protective height)
<b>Dimension D</b>	C-20
<b>Dimension P</b>	20

Protective height (C)	Number of Free-Location Brackets *1	Dimension F
0240 to 1200	2 *2	1000 mm max.
1280 to 1920	3	1000 mm max.

\*1. The number of brackets required to mount either one of emitter and receiver.

\*2. Mounting an emitter or receiver with one bracket is possible for the model of protective height of 0240. In this case, locate this bracket at half the Dimension C (or at the center of the sensor length).

**Mounted with Top/Bottom Brackets (F39-LGRTB) and Intermediate Bracket (F39-LGRA) Backside Mounting**



**F3SG-4RA-□□□□-25-02TS Series**

<b>Dimension C</b>	4-digit number of the type name (Protective height)
<b>Dimension D</b>	C-20
<b>Dimension G</b>	$C+27.2+N1+N2$
<b>Dimension H</b>	$C+38+N1+N2$
<b>Dimension I</b>	$C+58+N1+N2$
<b>Dimension N1</b>	0 to 30
<b>Dimension N2</b>	0 to 13
<b>Dimension P</b>	20

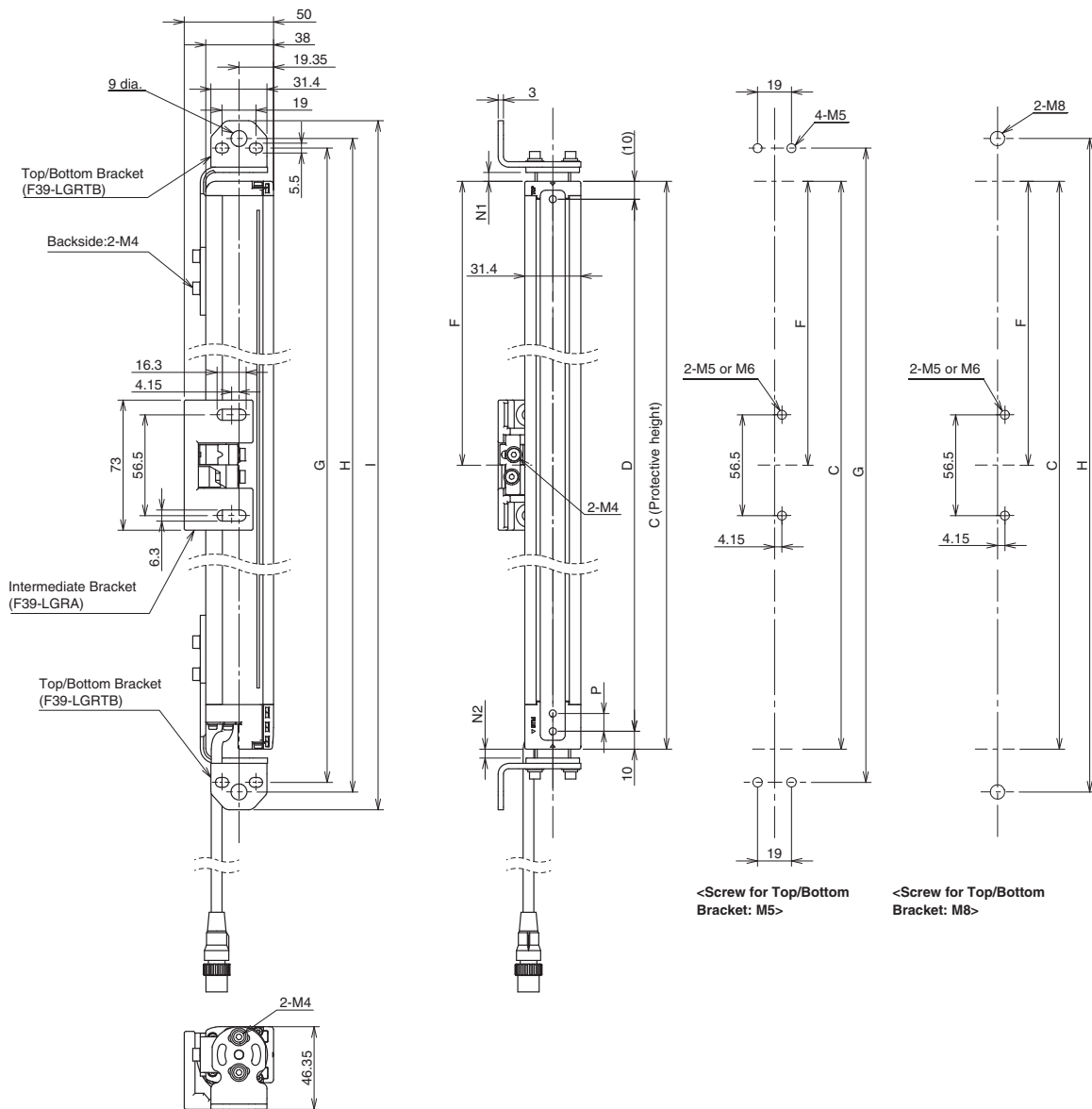
Protective height (C)	Number of Top/Bottom Brackets *	Number of Intermediate Brackets *	Dimension F
0240 to 1040	2	0	-
1120 to 1920	2	1	1000 mm max.

\* The number of brackets required to mount either one of emitter and receiver.

F3SG-RA-02TS

# F3SG-RA-02TS

## Side Mounting



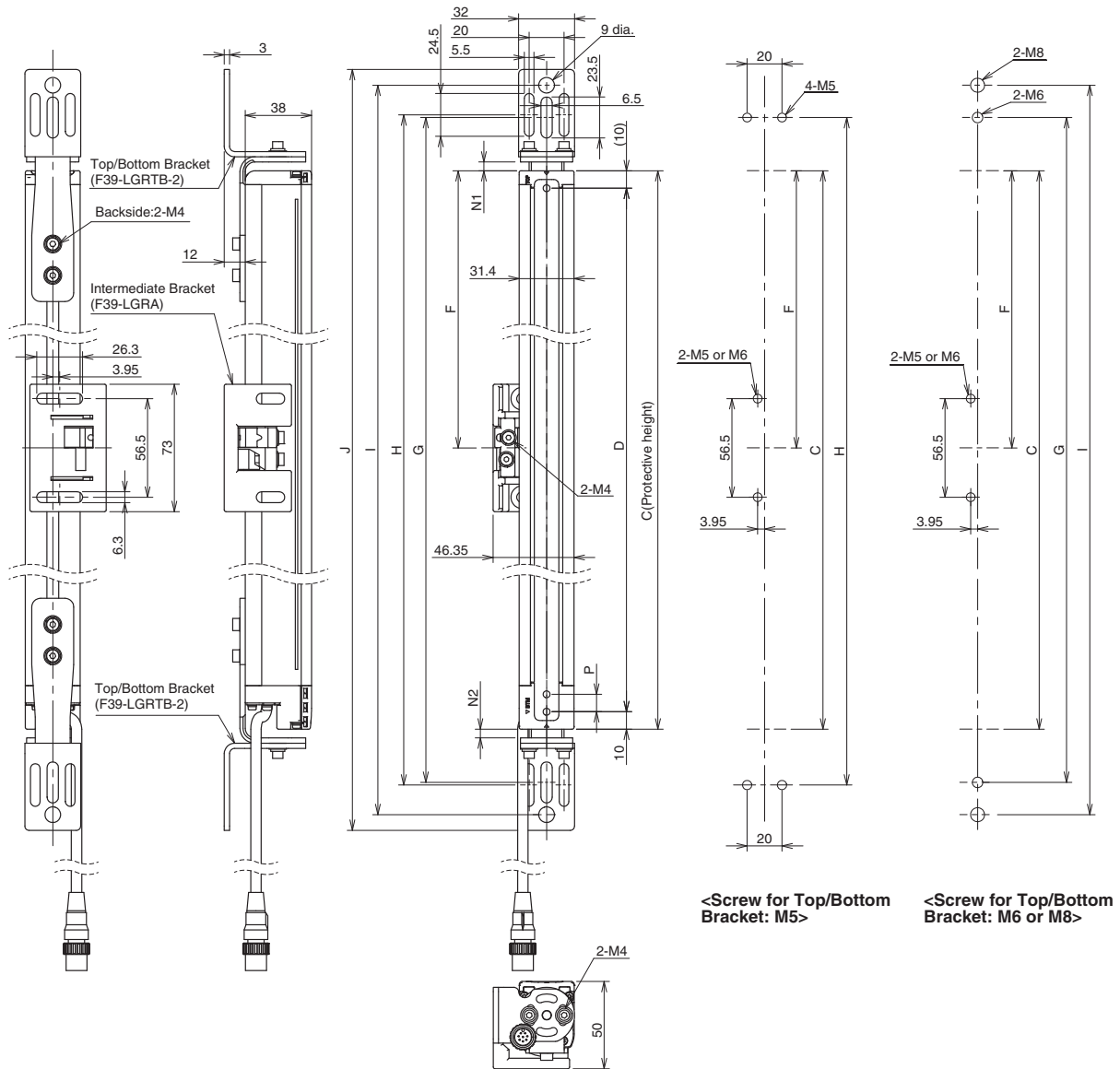
### F3SG-4RA-□□□□-25-02TS Series

<b>Dimension C</b>	4-digit number of the type name (Protective height)
<b>Dimension D</b>	C-20
<b>Dimension G</b>	$C+27.2+N1+N2$
<b>Dimension H</b>	$C+38+N1+N2$
<b>Dimension I</b>	$C+58+N1+N2$
<b>Dimension N1</b>	0 to 30
<b>Dimension N2</b>	0 to 13
<b>Dimension P</b>	20

Protective height (C)	Number of Top/Bottom Brackets *	Number of Intermediate Brackets *	Dimension F
0240 to 1040	2	0	-
1120 to 1920	2	1	1000 mm max.

\* The number of brackets required to mount either one of emitter and receiver.

**Mounted with Top/Bottom Brackets (F39-LGRTB-2) and Intermediate Bracket (F39-LGRA)  
Backside Mounting**



<Screw for Top/Bottom Bracket: M5>

<Screw for Top/Bottom Bracket: M6 or M8>

**F3SG-4RA-□□□□-25-02TS Series**

<b>Dimension C</b>	4-digit number of the type name (Protective height)
<b>Dimension D</b>	C-20
<b>Dimension G</b>	$C+51+N1+N2$
<b>Dimension H</b>	$C+54+N1+N2$
<b>Dimension I</b>	$C+88+N1+N2$
<b>Dimension J</b>	$C+106+N1+N2$
<b>Dimension N1</b>	0 to 30
<b>Dimension N2</b>	0 to 13
<b>Dimension P</b>	20

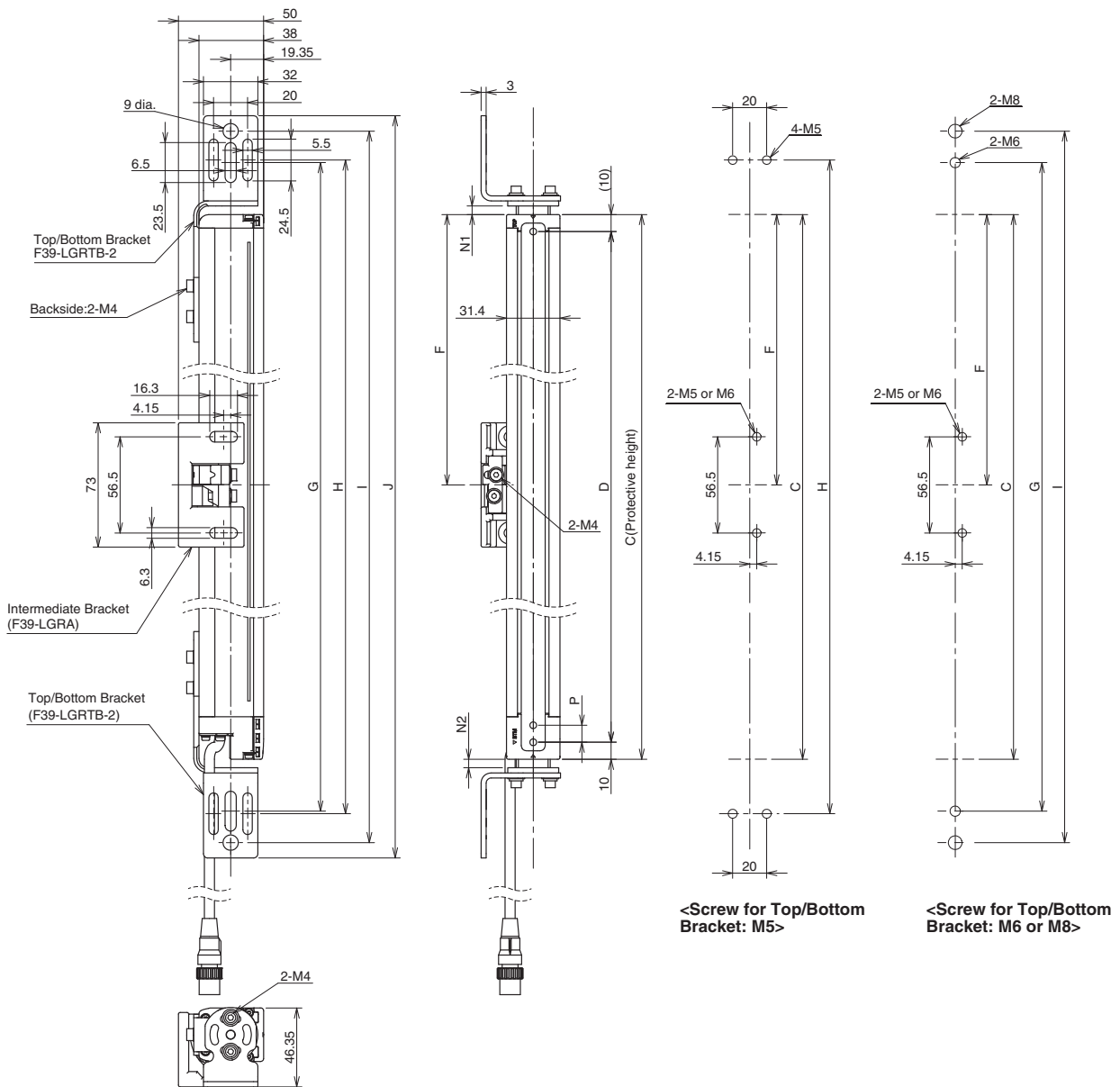
Protective height (C)	Number of Top/Bottom Brackets *	Number of Intermediate Brackets *	Dimension F
0240 to 1040	2	0	-
1120 to 1920	2	1	1000 mm max.

\* The number of brackets required to mount either one of emitter and receiver.

F3SG-RA-02TS

# F3SG-RA-02TS

## Side Mounting



<Screw for Top/Bottom Bracket: M5>

<Screw for Top/Bottom Bracket: M6 or M8>

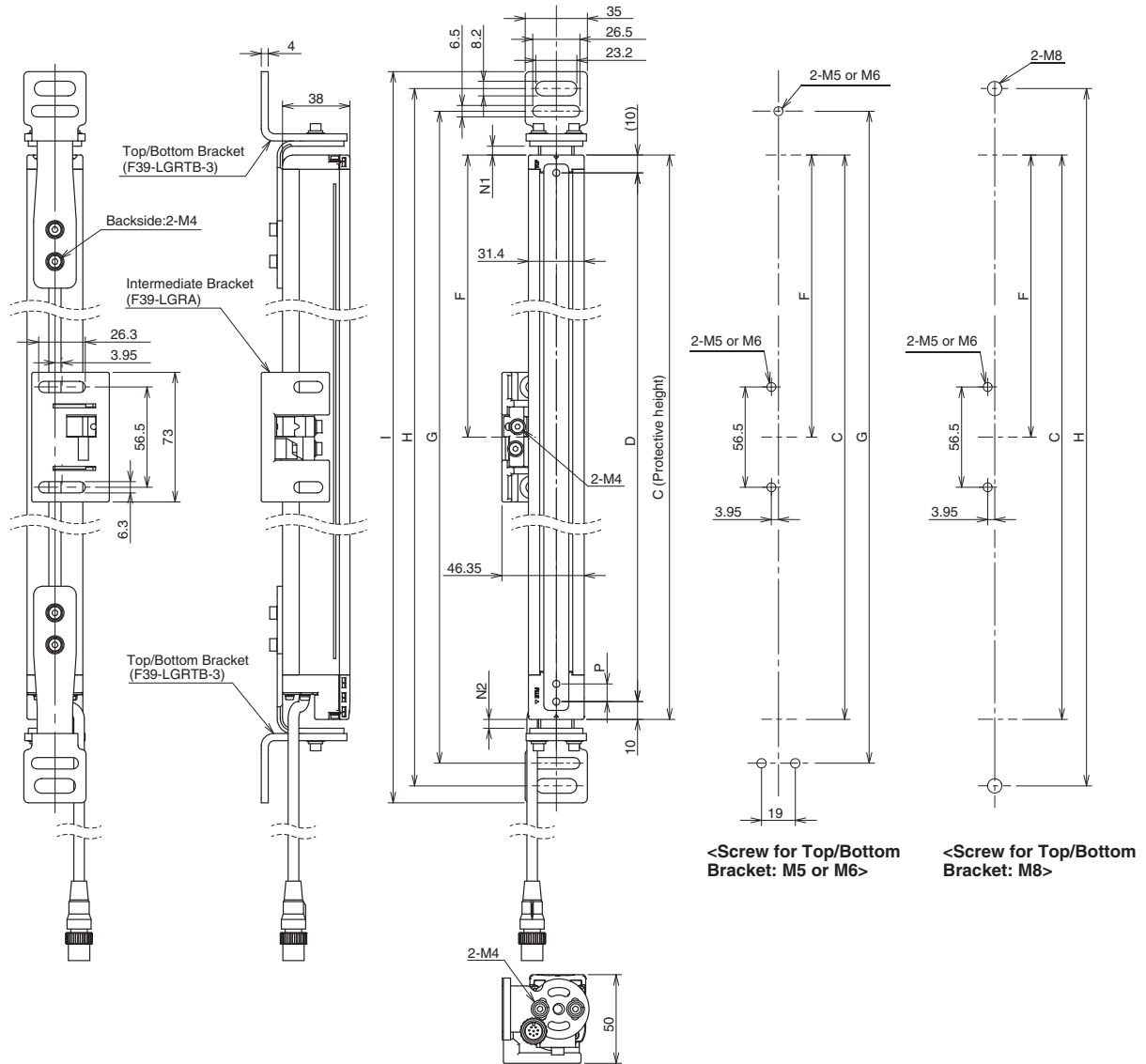
### F3SG-4RA-□□□□-25-02TS Series

<b>Dimension C</b>	4-digit number of the type name (Protective height)
<b>Dimension D</b>	C-20
<b>Dimension G</b>	$C+51+N1+N2$
<b>Dimension H</b>	$C+54+N1+N2$
<b>Dimension I</b>	$C+88+N1+N2$
<b>Dimension J</b>	$C+106+N1+N2$
<b>Dimension N1</b>	0 to 30
<b>Dimension N2</b>	0 to 13
<b>Dimension P</b>	20

Protective height (C)	Number of Top/Bottom Brackets *	Number of Intermediate Brackets *	Dimension F
0240 to 1040	2	0	-
1120 to 1920	2	1	1000 mm max.

\* The number of brackets required to mount either one of emitter and receiver.

**Mounted with Top/Bottom Brackets (F39-LGRTB-3) and Intermediate Bracket (F39-LGRA)  
Backside Mounting**



**F3SG-4RA-□□□□-25-02TS Series**

Dimension C	4-digit number of the type name (Protective height)
Dimension D	C-20
Dimension G	$C+39.5+N1+N2$
Dimension H	$C+65+N1+N2$
Dimension I	$C+84+N1+N2$
Dimension N1	0 to 30
Dimension N2	0 to 13
Dimension P	20

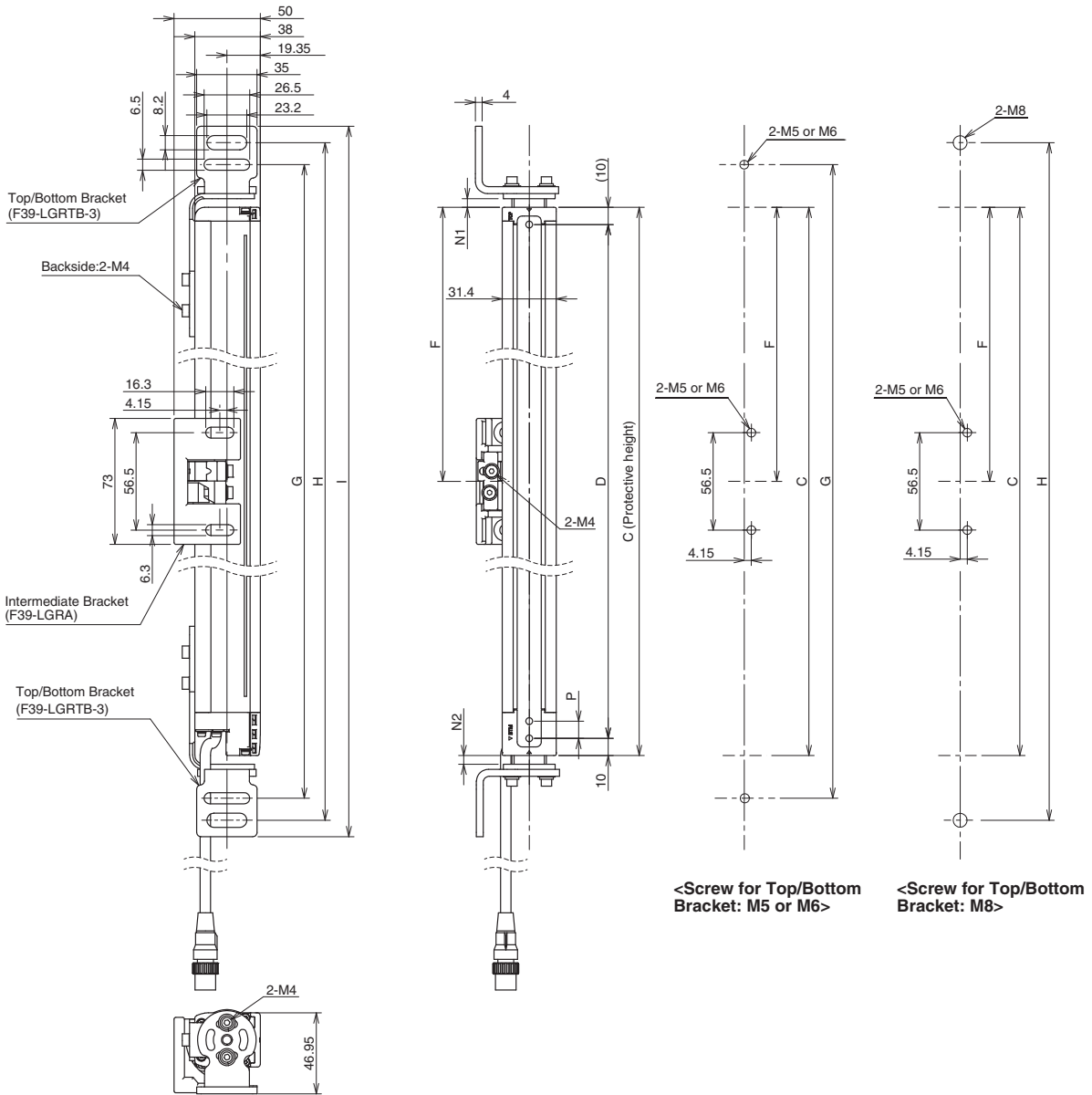
Protective height (C)	Number of Top/Bottom Brackets *	Number of Intermediate Brackets *	Dimension F
0240 to 1040	2	0	-
1120 to 1920	2	1	1000 mm max.

\* The number of brackets required to mount either one of emitter and receiver.

F3SG-RA-02TS

# F3SG-RA-02TS

## Side Mounting



### F3SG-4RA-□□□□-25-02TS Series

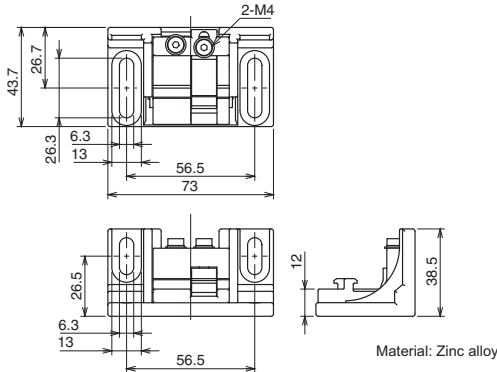
Dimension C	4-digit number of the type name (Protective height)
Dimension D	C-20
Dimension G	C+39.5+N1+N2
Dimension H	C+65+N1+N2
Dimension I	C+84+N1+N2
Dimension N1	0 to 30
Dimension N2	0 to 13
Dimension P	20

Protective height (C)	Number of Top/Bottom Brackets *	Number of Intermediate Brackets *	Dimension F
0240 to 1040	2	0	-
1120 to 1920	2	1	1000 mm max.

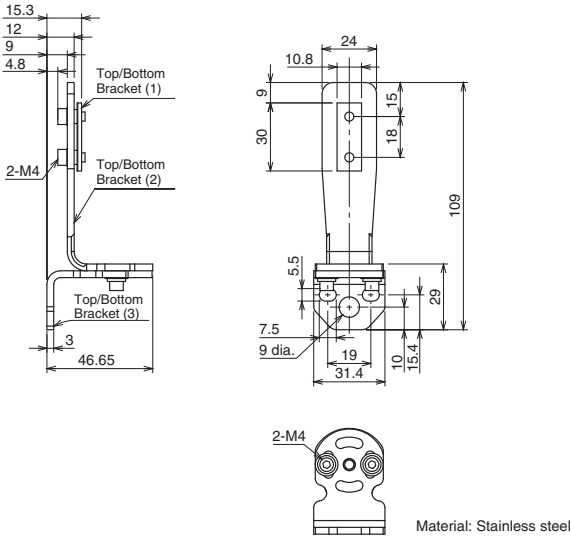
\* The number of brackets required to mount either one of emitter and receiver.

Accessories

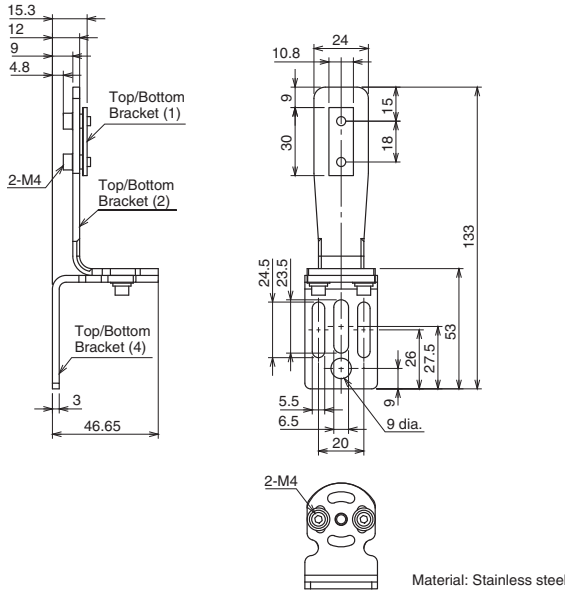
Sensor Mounting Brackets  
Free-Location Bracket / Intermediate Bracket  
(F39-LGRA, sold separately)



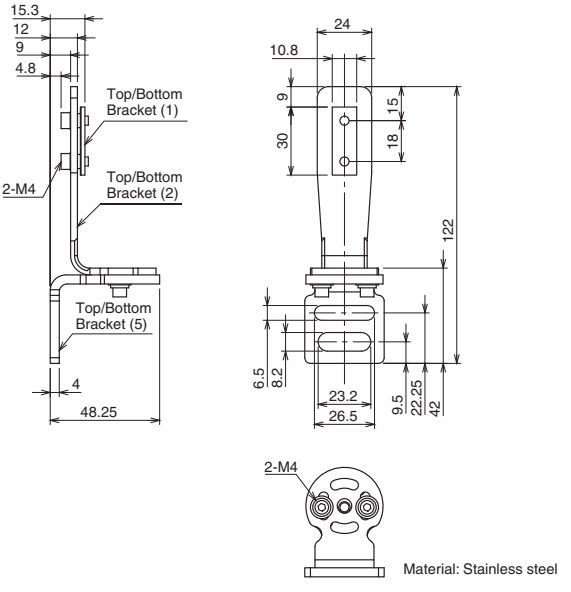
Top/Bottom Bracket  
(F39-LGRTB, sold separately)



Top/Bottom Bracket  
(F39-LGRTB-2, sold separately)



Top/Bottom Bracket  
(F39-LGRTB-3, sold separately)



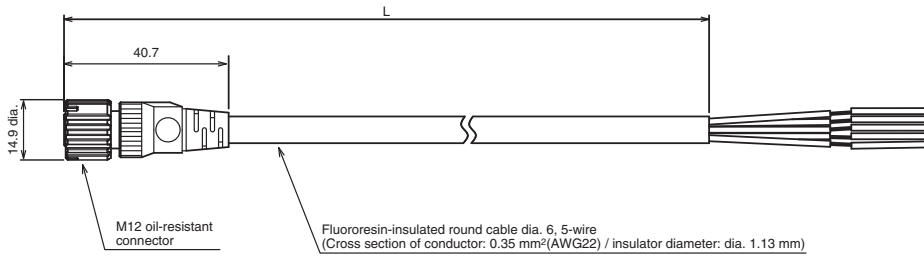
F3SG-RA-02TS



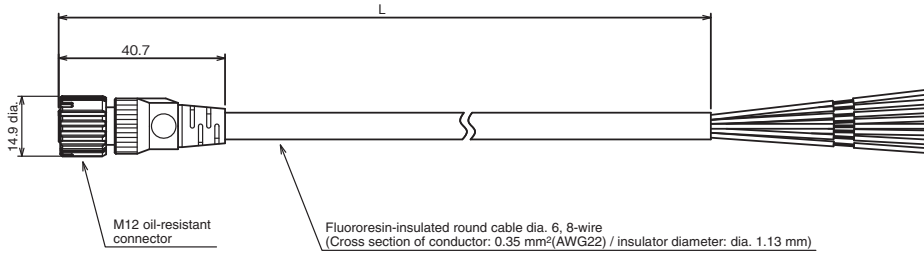
# F3SG-RA-02TS

## Safety light curtain connecting cable

### Single-Ended Cable for Emitter (Oil-Resistant Cable) (F39-JD□RA-L, sold separately)

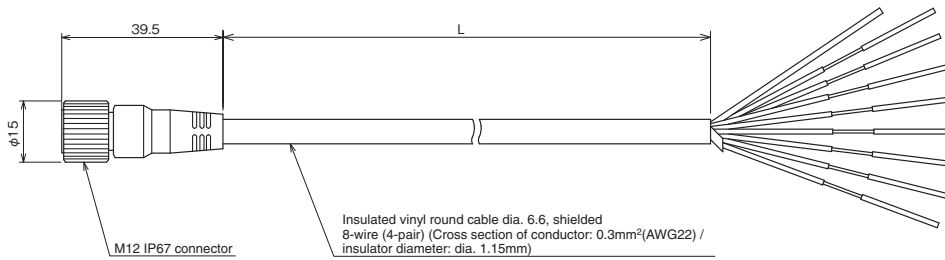


### Single-Ended Cable for Receiver (Oil-Resistant Cable) (F39-JD□RA-D, sold separately)

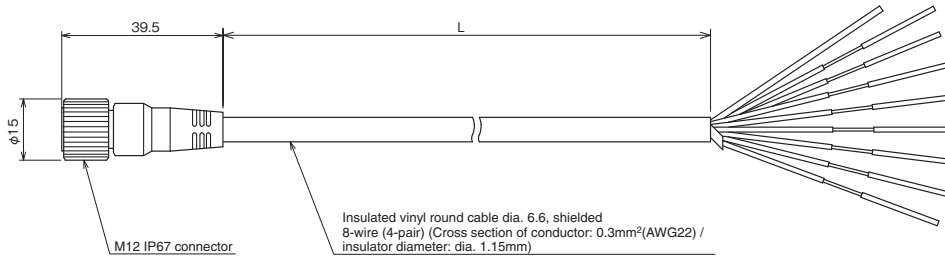


Emitter cable (Gray)	Receiver cable (Black)	L (m)
F39-JD3RA-L	F39-JD3RA-D	3
F39-JD7RA-L	F39-JD7RA-D	7

### Single-Ended Cable for Emitter (F39-JD□A-L, sold separately)

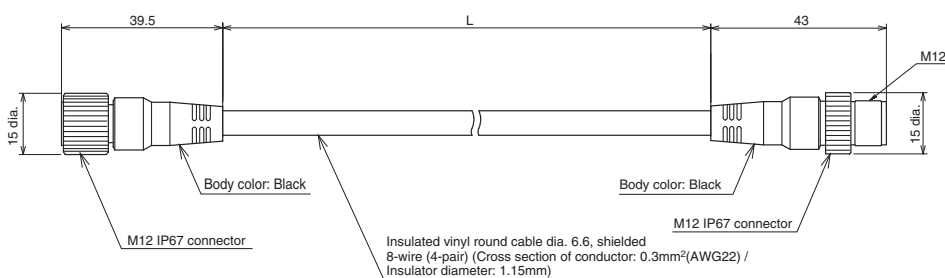


### Single-Ended Cable for Receiver (F39-JD□A-D, sold separately)

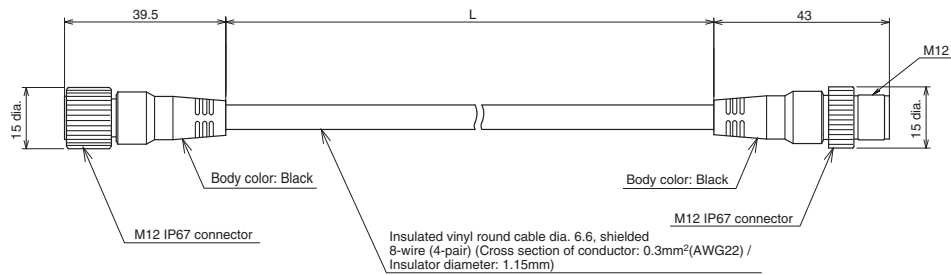


Emitter cable (Gray)	Receiver cable (Black)	L (m)
F39-JD3A-L	F39-JD3A-D	3
F39-JD7A-L	F39-JD7A-D	7
F39-JD10A-L	F39-JD10A-D	10
F39-JD15A-L	F39-JD15A-D	15
F39-JD20A-L	F39-JD20A-D	20

### Double-Ended Cable for Emitter: Cable for extension (F39-JD□B-L, sold separately)

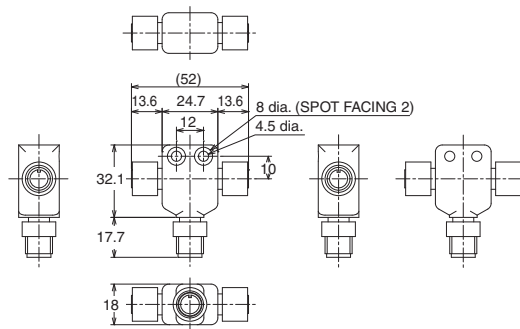


**Double-Ended Cable for Receiver: Cable for extension (F39-JD□B-D, sold separately)**

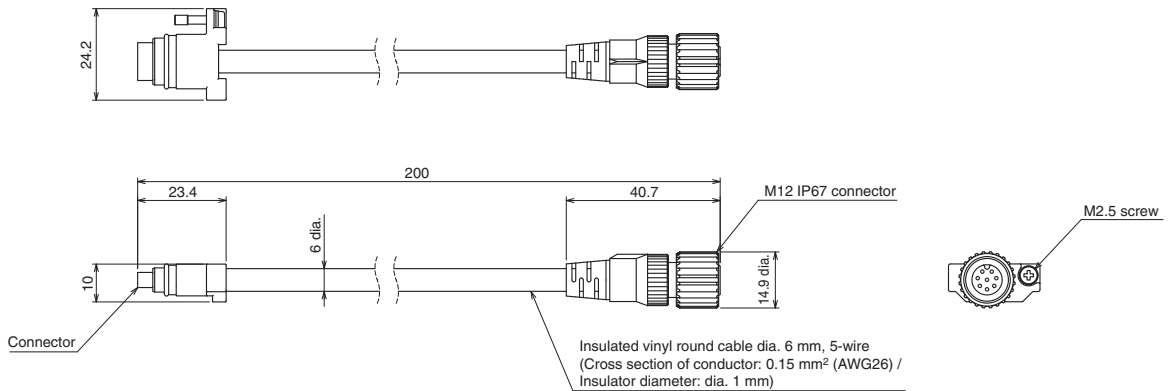


Emitter cable (Gray)	Receiver cable (Black)	L (m)
F39-JDR5B-L	F39-JDR5B-D	0.5
F39-JD1B-L	F39-JD1B-D	1
F39-JD3B-L	F39-JD3B-D	3
F39-JD5B-L	F39-JD5B-D	5
F39-JD7B-L	F39-JD7B-D	7
F39-JD10B-L	F39-JD10B-D	10
F39-JD15B-L	F39-JD15B-D	15
F39-JD20B-L	F39-JD20B-D	20

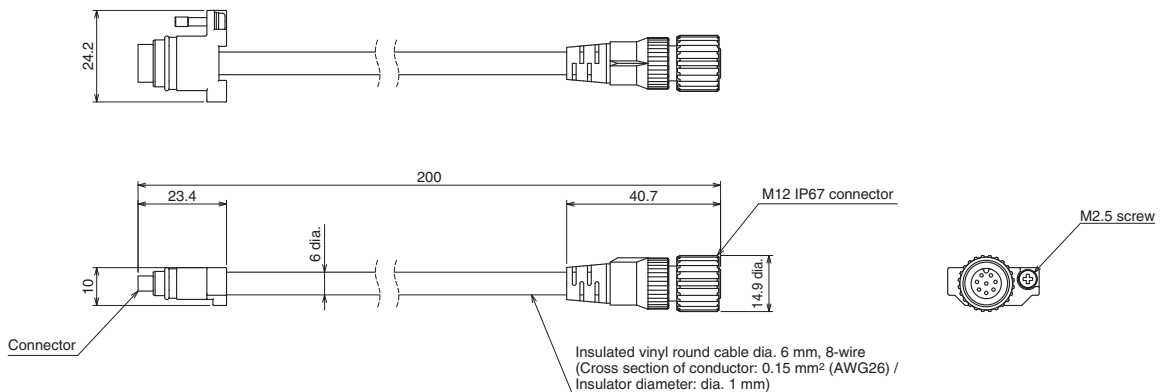
**Reduced Wiring Connector (F39-CN5, sold separately)**



**Cascading Cable for Emitter (F39-JGR2WTS-L, sold separately)**



**Cascading Cable for Receiver (F39-JGR2WTS-D, sold separately)**

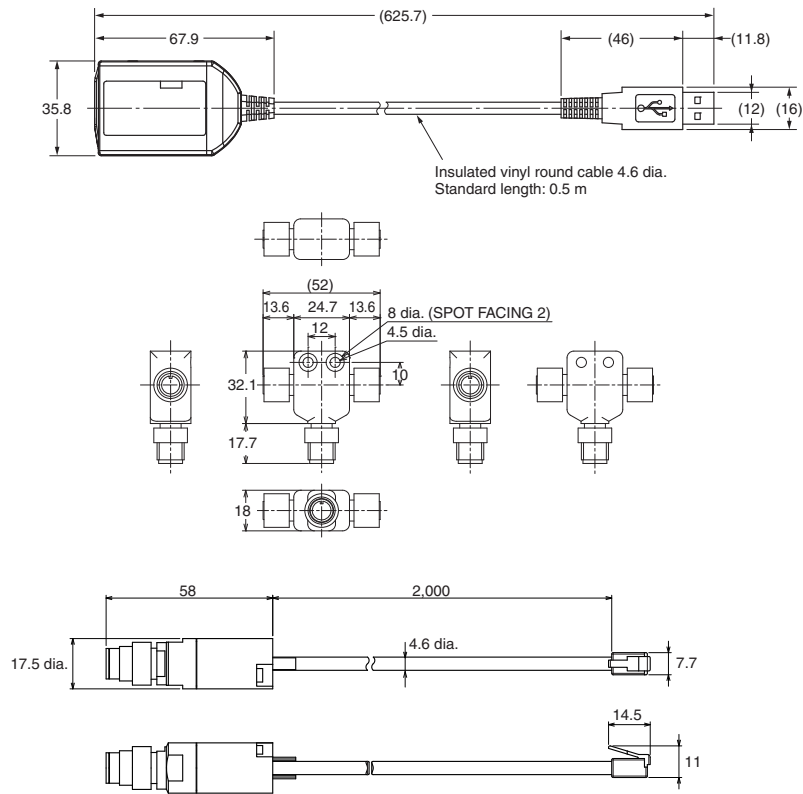


Set model name	Emitter cable (Gray)	Receiver cable (Black)	L (m)
F39-JGR2WTS	F39-JGR2WTS-L	F39-JGR2WTS-D	0.2

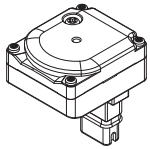
F3SG-RA-02TS

# F3SG-RA-02TS

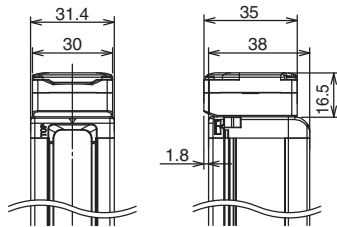
## Interface Unit (F39-GIF-1, sold separately)



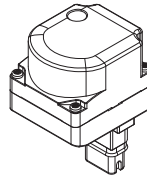
## Bluetooth Communication Unit (F39-BT, sold separately)



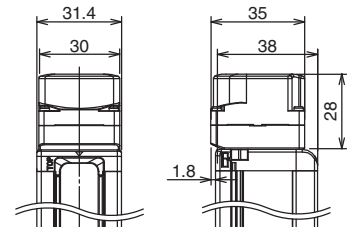
Material: PBT



## Lamp and Bluetooth Communication Unit (F39-BTLP, sold separately) Lamp (F39-LP, sold separately)



Material:  
PC (Lighting element)  
PBT (Other body parts)



## Related Manuals

ManNo.	Model	Manual name
Z391	F3SG-4RA□□□□-25-02TS	Safety Light Curtain F3SG-4RA□□□□-25-02TS Series User's Manual