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Small housing safety light curtain

The F3SJ_A - family is a type 4 safety light curtain with an optical resolution of 14 mm and 30 mm. An operating range of up to 9 m and protective heights up to 2,495 mm are provided with no dead zone.

- Detection height = sensor height
- Muting and blanking function available
- LED bar for easy alignment and diagnosis
- Type 4 sensor complying with EN 61496-1 and up to PLe according EN ISO 13849-1

Ordering information

Safety Light Curtain

Application	Detection capability	Beam gap	Operating range	Protective height (mm)	Order code
Finger protection	Dia. 14 mm	9 mm	0.2 to 9 m	245 to 1,631	F3SJ-A P14
Hand/arm protection	Dia. 30 mm	25 mm	0.2 to 9 m 0.2 to 7 m	245 to 1,620 1,745 to 2,495	F3SJ-A P30

Safety Light Curtain Model List

F3SJ-A14 Series (9 mm gap), F3SJ-A14 TS Series (9 mm gap)^{*1}

Number of Beams	Protective Height (mm) ^{*2}	Order code PNP Output ^{*1}
26	245	F3SJ-A0245P14
28	263	F3SJ-A0263P14
34	317	F3SJ-A0317P14
42	389	F3SJ-A0389P14
50	461	F3SJ-A0461P14
60	551	F3SJ-A0551P14
68	623	F3SJ-A0623P14
76	695	F3SJ-A0695P14
80	731	F3SJ-A0731P14
88	803	F3SJ-A0803P14
96	875	F3SJ-A0875P14
108	983	F3SJ-A0983P14
116	1,055	F3SJ-A1055P14
124	1,127	F3SJ-A1127P14
132	1,199	F3SJ-A1199P14
140	1,271	F3SJ-A1271P14

^{*1} The suffix "-TS" is attached to the model number of models with fixed auto reset.
(Only for PNP output)

^{*2} Protective Height (mm) = Total sensor length

F3SJ-A30 Series (25 mm gap)


Number of Beams	Protective Height (mm) ^{*1}	Order code PNP Output
10	245	F3SJ-A0245P30
12	295	F3SJ-A0295P30
16	395	F3SJ-A0395P30
19	470	F3SJ-A0470P30
21	520	F3SJ-A0520P30
22	545	F3SJ-A0545P30
23	570	F3SJ-A0570P30
25	620	F3SJ-A0620P30
29	720	F3SJ-A0720P30
32	795	F3SJ-A0795P30
35	870	F3SJ-A0870P30
37	920	F3SJ-A0920P30
38	945	F3SJ-A0945P30
41	1,020	F3SJ-A1020P30
44	1,095	F3SJ-A1095P30
45	1,120	F3SJ-A1120P30
48	1,195	F3SJ-A1195P30
51	1,270	F3SJ-A1270P30
56	1,395	F3SJ-A1395P30
65	1,620	F3SJ-A1620P30
70	1,745	F3SJ-A1745P30
75	1,870	F3SJ-A1870P30
80	1,995	F3SJ-A1995P30
90	2,245	F3SJ-A2245P30
95	2,370	F3SJ-A2370P30
100	2,495	F3SJ-A2495P30

^{*1} Protective Height (mm) = Total sensor length



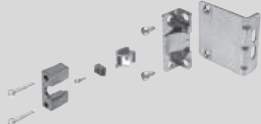





Accessories (Sold separately)

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

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

Appearance	Cable length	Specifications	Order code
	0.5 m	M12 connector (8-pin)	F39-JCR5A
	3 m		F39-JC3A
	7 m		F39-JC7A
	10 m		F39-JC10A
	15 m		F39-JC15A
	20 m		F39-JC20A

Sensor Mounting Brackets (Sold separately)

Appearance	Specifications	Application	Remarks	Order code
	Standard mounting bracket (for top/bottom)	(provided with the F3SJ)	2 for an emitter, 2 for a receiver, total of 4 per set	F39-LJ1
	Flat side mounting bracket	Use these small-sized brackets when performing side mounting with standard mounting brackets, so that they do not protrude from the detection surface.	2 for an emitter, 2 for a receiver, total of 4 per set	F39-LJ2
	Free-location mounting bracket (also used as standard intermediate bracket)	Use these brackets for mounting on any place without using standard bracket.	Two brackets per set	F39-LJ3
	F3SN Intermediate Bracket Replacement Spacers	When replacing the F3SN with the F3SJ, the mounting hole pitches in the Intermediate Brackets are not the same. This Spacer is placed between the mounting holes to mount the F3SJ.	1 set with 2 pieces	F39-LJ3-SN
	Top/bottom bracket B (Mounting hole pitch 19 mm)	Mounting bracket used when replacing existing area sensors (other than F3SN or F3WN) with the F3SJ. For front mounting. Suitable for mounting hole pitch of 18 to 20 mm.	2 for an emitter, 2 for a receiver, total of 4 per set	F39-LJ4
	Bracket for replacing short-length F3SN	Mounting bracket used when an F3SN with protective height of 300 mm or less is replaced by an F3SJ.	2 for an emitter, 2 for a receiver, total of 4 per set	F39-LJ5
	Space-saving mounting bracket	Use these brackets to mount facing inward. Length is 12 mm shorter than the standard F39-LJ1 bracket.	2 for an emitter, 2 for a receiver, total of 4 per set	F39-LJ8
	Top/bottom bracket C (mounting hole pitch 13 mm)	Mounting bracket used when replacing existing area sensors having a mounting pitch of 13 mm with the F3SJ.	2 for an emitter, 2 for a receiver, total of 4 per set	F39-LJ11

Specifications

F3SJ-A P14/P30

Model	PNP Output	F3SJ-A P14	F3SJ-A P30
Sensor type		Type 4 safety light curtain	
Version		Ver. 2	
Setting tool connection		Connectable	
Safety category		Safety purpose of category 4, 3, 2, 1, or B	
Detection capability		Opaque objects 14 mm in diameter	Opaque objects 30 mm in diameter
Beam gap (P)		9 mm	25 mm
Number of beams (n)		26 to 180	10 to 100
Protective height (PH)		245 to 1,631 mm	245 to 2,495 mm
Lens diameter		Diameter 5 mm	
Operating range		0.2 to 9 m (protective height 1,640 mm max.), 0.2 to 7 m (protective height 1,655 mm min.) (Depending on the setting tool, the detection distance can be shortened to 0.5 m.)	
Response time (under stable light incident condition)	ON to OFF	1 set, 0245 to 983: 11 ms to 17.5 ms max. 1,055 or higher: 20 ms to 25 ms max.	1 set: 10 ms to 17.5 ms max.
	OFF to ON	1 set, 0245 to 983: 44 ms to 70 ms max. 1,055 or higher: 80 ms to 100 ms max.	1 set: 40 ms to 70 ms max.
Startup waiting time		2 s max. (2.2 s max. for series connection)	
Power supply voltage (Vs)		24 VDC±20% (ripple p-p10% max.)	
Current consumption (no load)	Emitter	To 50 beams: 76 mA max., 51 to 100 beams: 106 mA max., 101 to 150 beams: 130 mA max., 151 to 180 beams: 153 mA max., 201 to 234 beams: 165 mA max.	
	Receiver	To 50 beams: 68 mA max., 51 to 100 beams: 90 mA max., 101 to 150 beams: 111 mA max., 151 to 180 beams: 128 mA max., 201 to 234 beams: 142 mA max.	
Light source (emitted wavelength)		Infrared LED (870 nm)	
Effective aperture angle (EAA)		Based on IEC 61496-2. Within±2.5° for both emitter and receiver when the detection distance is 3 m or over	
Safety outputs (OSSD)	PNP outputs	Two PNP transistor outputs, load current 300 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), allowable capacity load 2.2 µF, leak current 1 mA max. (This can be different from traditional logic (ON/OFF) because safety circuit is used.)	
Auxiliary output 1 (Non-safety output)	PNP outputs	One PNP transistor output, load current 300 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), leak current 1 mA max.	
Auxiliary output 2 (Non-safety output. Function for Basic System.)	PNP outputs	One PNP transistor output, load current 50 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), leak current 1 mA max.	
External indicator output (Non-safety output)		Available indicators Incandescent lamp: 24 VDC, 3 to 7 W LED lamp: Load current 10 mA to 300 mA max., leak current 1 mA max. (To use an external indicator, an F39-JJ3N universal indicator cable or an F39-A01P-PAC dedicated external indicator kit is required.)	
Output operation mode	Receiver	Safety output 1, 2: ON when receiving light Auxiliary output 1: Inverse of safety output signals (Operation mode can be changed with the setting tool.) External indicator output 1: Inverse of safety output signals for a basic system (Operation mode can be changed with the setting tool.), ON when muting/override for a muting system (Operation mode can be changed with the setting tool.)	
	Emitter	Auxiliary output 2: Turns ON when the point of 30,000 operating hours is reached (Operation mode can be changed with the setting tool.) External indicator output 2: ON when lock-out for a basic system (Operation mode can be changed with the setting tool.) ON when muting/override for a muting system (Operation mode can be changed with the setting tool.)	

Model	PNP output	F3SJ-A P14	F3SJ-A P30
Input voltage	PNP output	Test input, interlock selection input, reset input, and muting input are all ON voltage: 9 to 24 V (Vs) (sink current: 3 mA max.), OFF voltage: 0 to 1.5 V, or open External device monitoring input ON voltage: 9 to 24 V (Vs) (sink current: 5 mA max.), OFF voltage: 0 to 1.5 V, or open	
Indicator	Emitter	Light intensity level indicators (green LED x 2, orange LED x 3): ON based on the light intensity Error mode indicators (red LED x 3): Blink to indicate error details Power indicator (green LED x 1): ON while power is on Interlock indicator (yellow LED x 1): ON while under interlock, blinks at lockout. External device monitoring indicator (muting input 1 indicator), Blanking/test indicator (muting input 2 indicator) (green LED x 2): ON/flash according to function	
	Receiver	Light intensity level indicators (green LED x 2, orange LED x 3): ON based on the light intensity Error mode indicators (red LED x 3): Blink to indicate error details OFF output indicator (red LED x 1): ON when safety output is OFF, blinks at lockout. ON output indicator (green LED x 1): ON while safety output is ON Muting error indicator, Blanking /test indicator (green LED x 2): ON/flash according to function	
Mutual interference prevention function		Interference light prevention algorithm, sensing distance change function	
Series connection		Time division emission by series connection Number of connections: up to 4 sets (F3SJ-A only) F3SJ-E, F3SJ-B and F3SJ-TS cannot be connected. Total number of beams: up to 400 beams Maximum cable length for 2 sets: no longer than 15 m	
Test function		Self test (at power-ON and at power distribution) External test (emission stop function by test input)	
Safety-related functions		Start interlock, restart interlock (Must be set with a setting tool when the muting function is used.) External device monitor Muting (Lamp burnout detection, override function included. F39-CN6 key cap for muting is required.) Fixed blanking (must be set by a setting tool) Floating blanking (must be set by a setting tool)	
Connection method		Connector method (M12, 8-pin)	
Protection circuit		Output short-circuit protection, and power supply reverse polarity protection	
Ambient temperature		Operating: -10 to 55°C (no icing), Storage: -30 to 70°C	
Ambient humidity		Operating: 35% to 85% (no condensation), Storage: 35% to 95%	
Operating ambient light intensity		Incandescent lamp: receiving-surface light intensity of 3,000 lx max., Sunlight: receiving-surface light intensity of 10,000 lx max.	
Insulation resistance		20 MΩ min. (at 500 VDC)	
Withstand voltage		1,000 VAC 50/60 Hz, 1 min	
Degree of protection		IP65 (IEC 60529)	
Vibration resistance		Malfunction: 10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps in X, Y, and Z directions	
Shock resistance		Malfunction: 100 m/s ² , 1,000 times each in X, Y, and Z directions	
Material		Casing (including metal parts on both ends): Aluminum, zinc die-cast Cap: ABS resin, Optical cover: PMMA resin (acrylic), Cable: Oil resistant PVC	
Weight (packaged)		Calculate using the following expressions: (1) For F3SJ-A 14, weight (g) = (protective height) x 1.7 + α (2) F3SJ-A 30, weight (g) = (protective height) x 1.5 + α The values for α are as follows: Protected height 245 to 596 mm: = 1,100 protected height 1,660 to 2,180 mm: = 2,400 Protected height 600 to 1,130 mm: = 1,500 protected height 2,195 to 2,500 mm: = 2,600 Protected height 1,136 to 1,658 mm: = 2,000	
Accessories		Test rod (*1), instruction manual, standard mounting bracket (F39-LJ1 bracket for top/bottom mounting), mounting brackets (intermediate) (*2), error mode label, User's Manual (CD-ROM) *1. The F3SJ-A 55 is not included. *2. Number of intermediate brackets depends on protective height of F3SJ. For protective height from 600 to 1,130 mm: 1 set for each of the emitter and receiver is included For protective height from 1,136 to 1,658 mm: 2 sets for each of the emitter and receiver are included For protective height from 1,660 to 2,180 mm: 3 sets for each of the emitter and receiver are included For protective height from 2,195 to 2,500 mm: 4 sets for each of the emitter and receiver are included	
Applicable standards		IEC 61496-1, EN 61496-1 UL 61496-1, Type 4 ESPE (Electro-Sensitive Protective Equipment) IEC 61496-2, CLC/TS 61496-2, UL 61496-2, Type 4 AOPD (Active Opto-electronic Protective Devices) IEC 61508-1 to -3, EN 61508-1 to -3 SIL3 IEC 13849-1: 2006, EN ISO 13849-1: 2008 (PL, Cat.4) UL 508, UL 1998, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8	

Response Time

Model	Protected Height (mm)	Number of Beams	Response time ms (ON to OFF)	Response time ms (OFF to ON)
F3SJ-A ____ 14 Series	245 to 263	26 to 28	11	44
	281 to 389	30 to 42	12	48
	407 to 497	44 to 54	13	52
	515 to 605	56 to 66	14	56
	623 to 731	68 to 80	15	60
	767 to 983	84 to 108	17.5	70
	1,055 to 1,271	116 to 140	20	80
	1,343 to 1,559	148 to 172	22.5	90
F3SJ-A ____ 30 Series	1,631	180	25	100
	245 to 395	10 to 16	10	40
	420 to 720	17 to 29	11	44
	745 to 1,045	30 to 42	12	48
	1,070 to 1,295	43 to 52	13	52
	1,395 to 1,620	56 to 65	14	56
	1,745 to 1,995	70 to 80	15	60
	2,120 to 2,495	85 to 100	17.5	70

Note: Use the following expressions for series connection.

- For 2-set series connection:
Response time (ON to OFF): Response time of the 1st unit + Response time of the 2nd unit - 1 (ms), Response time (OFF to ON): Response time calculated by the above x 4 (ms)
- For 3-set series connection:
Response time (ON to OFF):
Response time of the 1st unit + Response time of the 2nd unit + Response time of 3rd unit - 5 (ms), Response time (OFF to ON): Response time calculated by the above x 5 (ms)
For models with the "-TS" suffix, multiply the response time obtained by the above x 5 (ms), or use 200 ms, whichever is less.)
- For 4-set series connection:
Response time (ON to OFF): Response time of the 1st unit + Response time of the 2nd unit + Response time of the 3rd unit + Response time of the 4th unit - 8 (ms)
Response time (OFF to ON): Response time calculated by the above x 5 (ms)

Cable Extension Length

Total cable extension length must be no greater than the lengths described below.

When the F3SJ and an external power supply are directly connected, or when the F3SJ is connected to a G9SA-300-SC.

Condition	1 set	2 sets	3 sets	4 sets
Using incandescent lamp for auxiliary output and external indicator output	45 m	40 m	30 m	20 m
Not using incandescent lamp	100 m	60 m	45 m	30 m

When connected to the F3SP-B1P

Condition	1 set	2 sets	3 sets	4 sets
Using incandescent lamp for external indicator output 2	40 m	30 m	25 m	20 m
Using incandescent lamp for external indicator output 1	60 m	45 m	30 m	20 m
Using incandescent lamp for auxiliary output 1				
Not using incandescent lamp	100 m	60 m	45 m	30 m

Note: Keep the cable length within the rated length. Failure to do so is dangerous as it may prevent safety functions from operating normally.

Accessories

Control Unit

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

^{*1} NPN output type cannot be connected. Also, the system cannot be used as a muting system.

Laser Pointer

Item	F39-PTJ
Applicable sensor	F3SJ Series
Power supply voltage	4.65 or 4.5 VDC
Battery	Three button batteries (SR44 or LR44)
Battery life ^{*1}	SR44: 10 hours of continuous operation, LR44: 6 hours of continuous operation
Light source	Red semiconductor laser (wavelength: 650 nm, 1 mW max. JIS class 2, EN/IEC class 2, FDA class II)
Spot diameter (typical value)	6.5 mm at 10 m
Ambient temperature	Operating: 0 to 40°C Storage: -15 to 60°C (with no icing or condensation)
Ambient humidity	Operating and storage: 35% to 85% (with no condensation)
Material	Laser module case: aluminum Mounting bracket: aluminum and stainless
Weight	Approx. 220 g (packed)
Accessories	Laser safety standard labels (EN: 1, FDA: 3) Button batteries (SR44: 3), instruction manual

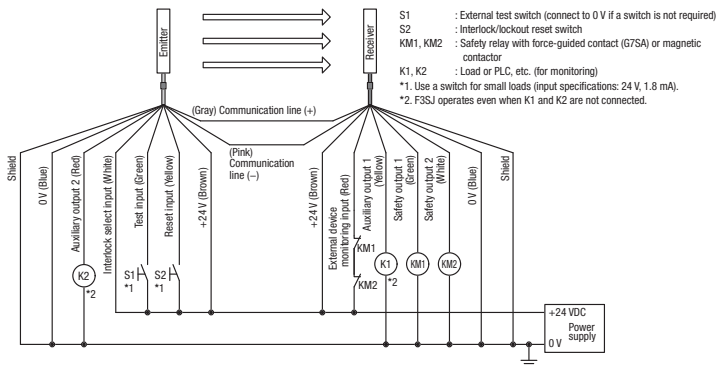
^{*1} Battery life varies depending on a battery used.

Connections

Basic Wiring Diagram

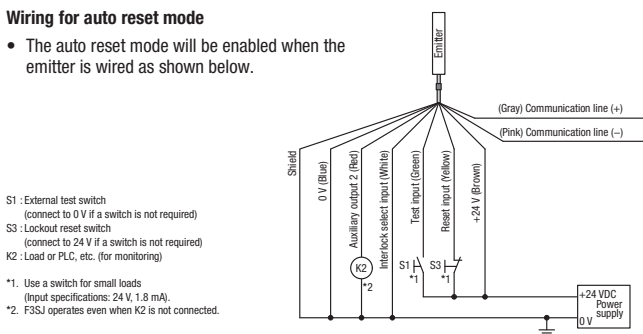
PNP Output

Wiring when using manual reset mode, external device monitoring.



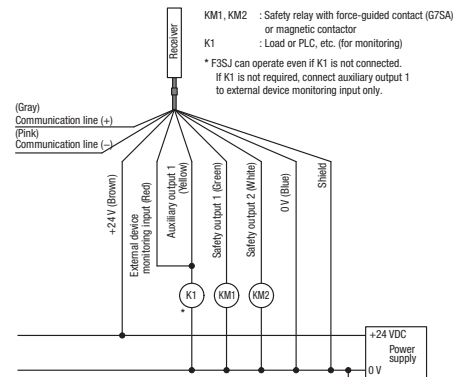
Wiring for auto reset mode

- The auto reset mode will be enabled when the emitter is wired as shown below.



Wiring when the external device monitoring function will not be used

- Use a setting tool to set the external device monitoring function to "Disabled."
- When using an auxiliary output 1 that has not been changed (output operation mode is "control output data," and inverse of safety output signals is "Enabled"), the external device monitoring function will be disabled when auxiliary output 1 and the external device monitoring input are connected as shown below.

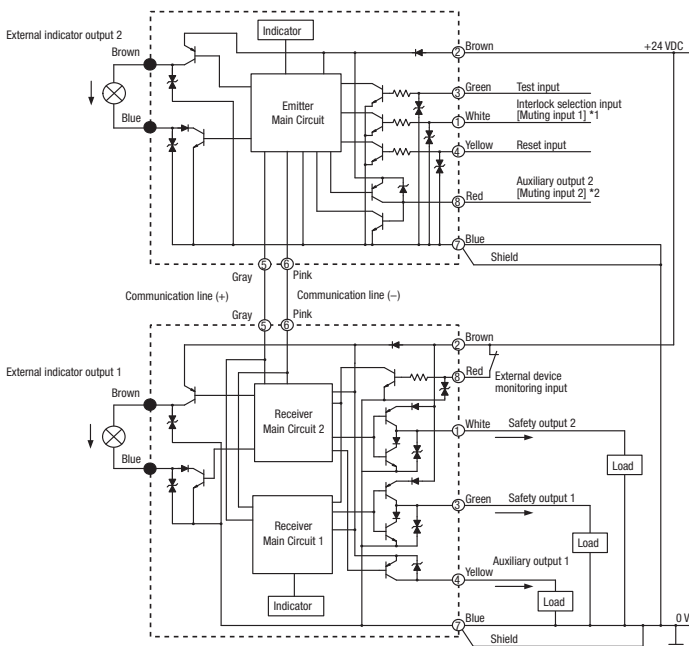


Input/Output Circuit Diagram

Entire Circuit Diagram

PNP Output

The numbers in circles indicate the connectors' pin numbers. The black circles indicate connectors for series connection. The words in brackets ([]) indicate the signal name for muting system.



*1 Open or muting input 1 for models with the "-TS" suffix.

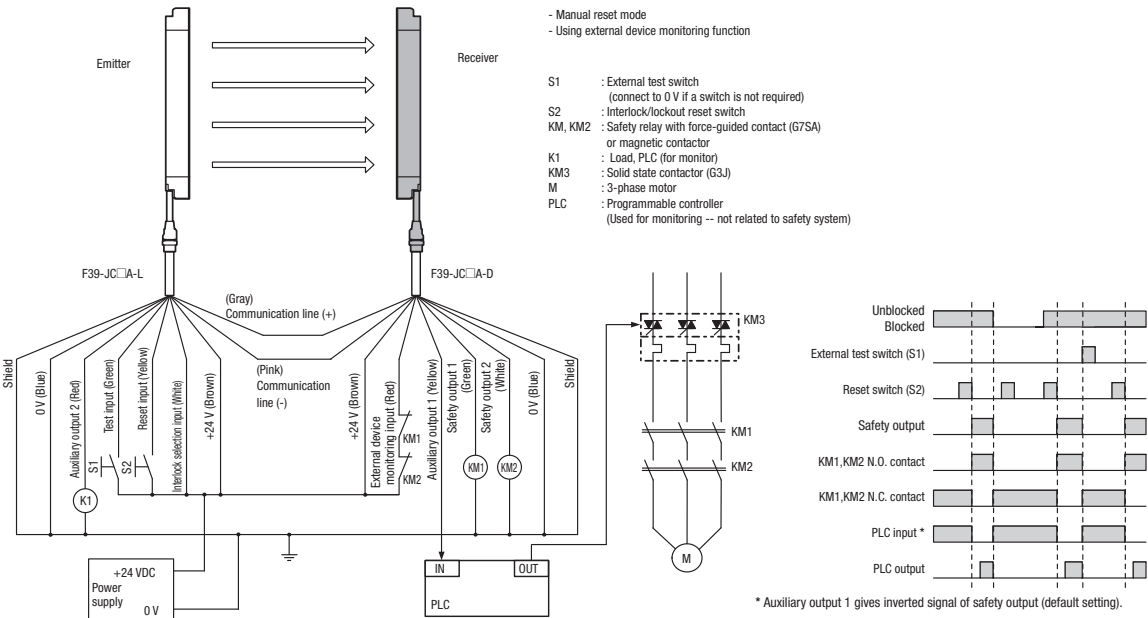
*2 Open or muting input 2 for models with the "-TS" suffix.

Connection Circuit Examples

Wiring for single F3SJ application (Category 4 acc. EN 954-1 and PLe acc. EN ISO 13849-1)

PNP Output

- Use of relay contact welding detection and interlock is possible without a controller or relay unit



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Product	Code	Reference	Product link
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	133532		Buy on EAN
	133533		Buy on EAN
	133534		Buy on EAN
Proximity Sensor, Inductive dia.4mm Flush 1.2mm PNP NA 3h 5m Cable	382448	E2E-C04S12-WC-B1 5M	Buy on EAN
	360316	EE-SX913P-R 3M	Buy on EAN
Temperature and Process Ctrl.Temp, Ent.Univ, Sal.SSR, Sal.relay, 4sal.aux, HBA, 4Ent Evt, 24Vdc / Vac, Screw, 48x96	385327	E5EC-TQR4D5M-010	Buy on EAN
Safety relay unit, 3PST-NO, 3 A, 120 VAC	150737		Buy on EAN
Industrial Relays, DPDT 10A Indic. LED-button mechanical test	376766		Buy on EAN