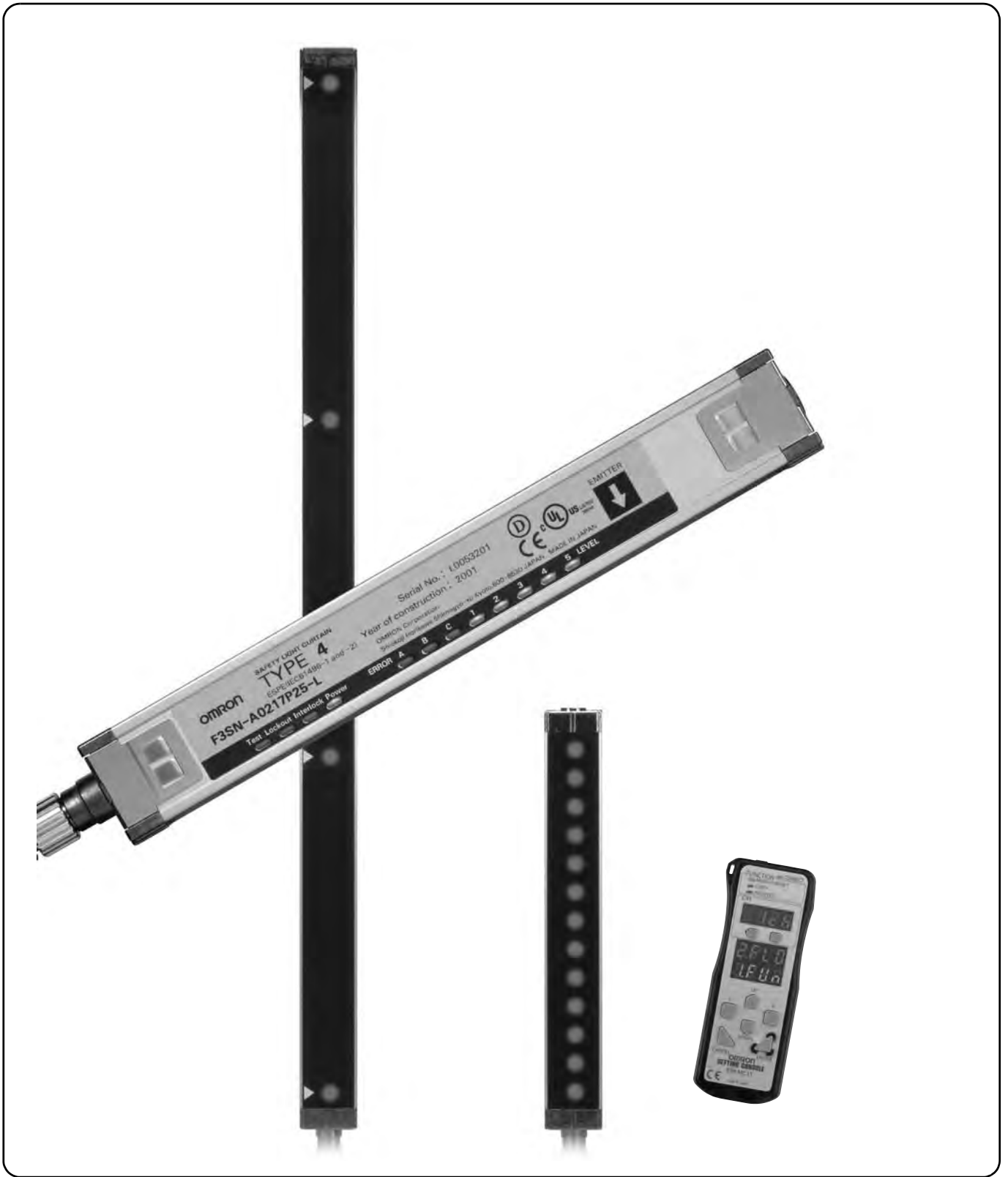


Safety Light Curtain/Multi-beam Safety Sensor

F3SN-A/F3SN-B/F3SH-A



Safety Light Curtain/Multi-beam Safety Sensor **F3SN-A/F3SN-B/F3SH-A**

Available Models

■ Main unit

F3SN-A Safety Light Curtain (Type 4)

Infrared

Detection capability	Beam gap	Appearance	Operating range	Number of beams	Protective height	Connector for series-connection	Model (see note 1)
14 mm-dia. (for finger protection)	9 mm			21 to 125 (odd numbers only)	189 to 1125 mm (every 18 mm)	No	F3SN-A□□□□P14
						Yes	F3SN-A□□□□P14-01 (see note 2)
25 mm-dia. (for hand protection)	15 mm		13 to 120	217 to 1822 mm (every 15 mm)	No	F3SN-A□□□□P25	
					Yes	F3SN-A□□□□P25-01 (see note 2)	
40 mm-dia. (for presence protection)	30 mm	7 to 60	217 to 1807 mm	No	F3SN-A□□□□P40		
				Yes	F3SN-A□□□□P40-01 (see note 2)		
70 mm-dia. (for presence detection)	60 mm	5 to 30	277 to 1777 mm	No	F3SN-A□□□□P70		
				Yes	F3SN-A□□□□P70-01 (see note 2)		

Note: 1. The □□□□ in the model numbers indicates the protective height (in mm). Refer to *Safety Light Curtain* on page 7 for model number details.
 2. Safety Light Curtains of model numbers ending in -02 through -05, provided with different connector configurations, are also available as options. Consult with your dealer or OMRON representative when ordering this model.

F3SN-B Safety Light Curtain (Type 2)

Infrared

Detection capability	Beam gap	Appearance	Operating range	Number of beams	Protective height	Output (see note 1)	Model (see note 2, 3)
25 mm-dia. (for hand protection)	15 mm			13 to 119 (noncontinuous)	217 to 1807 mm	PNP transistor output	F3SN-B□□□□P25
40 mm-dia. (for presence detection)	30 mm			7 to 60 (noncontinuous)	217 to 1807 mm		F3SN-B□□□□P40
70 mm-dia. (for presence detection)	60 mm			5 to 30	277 to 1777 mm		F3SN-B□□□□P70

Note: 1. For details of the method for securing safety by using an NPN transistor for output, contact OMRON's sales representatives.
 2. The □□□□ in the model numbers indicates the protective height (in mm). Refer to *Safety Light Curtain* on page 7 for model number details.
 3. Safety Light Curtains of model numbers ending in -02 through -05, provided with different connector configurations, are also available as options. Consult with your dealer or OMRON representative when ordering this model.

F3SH-A Multi-beam Safety Sensor (Type 4)


Infrared

Beam gap	Appearance	Operating range	Number of beams	Outermost beam gap	Connector for series-connection	Model
300 mm (for whole body protection)			4	900 mm	No	F3SH-A09P03
					Yes	F3SH-A09P03-01 (see note)


Note: Safety Light Curtains of model numbers ending in -02 through -05, provided with different connector configurations, are also available as options. Consult with your dealer or OMRON representative when ordering this model.

■ Accessories (Optional)


Control Unit

Appearance	Output	Model	Remarks
	Relay, 3NO + 1NC	F3SP-B1P	For connection with the F3SN-A, F3SN-B, and F3SH-A, use F39-JC□B cables fitted with connectors at both ends.


Safety Relay Unit

Appearance	Output	Model	Remarks
	Relay, 3NO	G9SA-300-SC	For connection with the F3SN-A, F3SN-B, and F3SH-A, use F39-JC□C cables fitted with connectors at both ends.


Muting Controller

Appearance	Model	Remarks
	F3SP-U2P	For connection with the F3SN-A, F3SN-B, and F3SH-A, use F39-JC□A cables fitted with connectors at single end.


Setting Console

Appearance	Model	Accessories
	F39-MC11	One branching connector, one connector cap, 2-m cable, instruction manual


Branching Connector

Appearance	Model	Remarks
	F39-CN1	Purchase this connector when needed additionally for installing the F39-MC11.

Single-ended Connector Cable (For Emitter and Receiver Set)

Appearance	Cable length	Specification	Model
	3 m	M 12 connector (8 pin)	F39-JC3A
	7 m		F39-JC7A
	10 m		F39-JC10A
	15 m		F39-JC15A


Double-ended Connector Cable (For Emitter and Receiver Set)

Appearance	Cable length	Specification	Model	Application
	0.2 m	M12 connector (8 pins)	F39-JCR2B	Series connection or connection with F3SP-B1P
	0.5 m		F39-JCR5B	
	3 m		F39-JC3B	
	5 m		F39-JC5B	Connection with F3SP-B1P (see note 1)
	7 m		F39-JC7B	
	10 m		F39-JC10B	
	15 m		F39-JC15B	
	20 m		F39-JC20B	
	0.2 m		M12 connector (8 pins)	
	1 m	F39-JC1C		
	3 m	F39-JC3C		
	7 m	F39-JC7C		
	10 m	F39-JC10C		
	15 m	F39-JC15C		

Note: 1. Cannot be used for series-connection purpose.

2. When two or more cables have to be used for connection with the G9SA-300-SC, connect the necessary number of F39-JC□B cables to one F39-JC□C cable.
 (Example) When a 35 m long cable is required, connect two F39-JC□B cables to one F39-JC□C.

External Indicators (Separate Models for Emitters and Receivers)

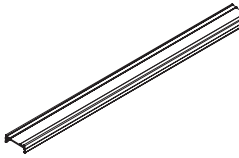
Appearance	Specification	Indicator	Type	Model
	M12 connector for PNP output	Red	Emitter	F39-A01PR-L
			Receiver	F39-A01PR-D
		Green	Emitter	F39-A01PG-L
			Receiver	F39-A01PG-D

Note: These indicators are used for connecting with series-connection type emitters/receivers (models ending in -01). The desired turn-ON timing (type of signal) can be selected on setting console. (Only Light-On Mode is available with F3SN-B)

Mirror (Reduces Operating Range by 12% with Each Unit)

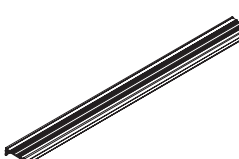
Mirror material	Width (mm)	Depth (mm)	Length (mm)	Model
Glass mirror	145	32	406	F39-MLG0406
			610	F39-MLG0610
			711	F39-MLG0711
			914	F39-MLG0914
			1067	F39-MLG1067
			1219	F39-MLG1219
			1422	F39-MLG1422
			1626	F39-MLG1626
			1830	F39-MLG1830
			2134	F39-MLG2134

**Spatter Protection Cover (Includes Two Pieces for Emitter and Receiver)
(Reduces Operating Range by 10% with Each Unit)**

Appearance	Applicable sensor	Model
	F3SN-A□□□□P14(-01)	F39-HN□□□□-14
	F3SN-A□□□□P25(-01)	F39-HN□□□□-25
	F3SN-A□□□□P40(-01)	
	F3SN-A□□□□P70(-01)	
	F3SN-B□□□□P25(-01)	
	F3SN-B□□□□P40(-01)	
	F3SN-B□□□□P70(-01)	
	F3SH-A09P03(-01)	F39-HH09-03


Note: The same 4-digit numbers as the protective heights (□□□□ in the light curtain type names) are substituted by □□□□ in the model names.

Spatter Protection Slit Cover (Includes Two Pieces for Emitter and Receiver; see note)

Appearance	Applicable sensor	Model	
		Slit width: 1.15 mm	Slit width: 0.6 mm
	F3SN-A□□□□P14(-01)	F39-HS□□□□A-14	F39-HS□□□□B-14
	F3SN-A□□□□P25(-01)	F39-HS□□□□A-25	F39-HS□□□□B-25
	F3SN-A□□□□P40(-01)		
	F3SN-A□□□□P70(-01)		
	F3SN-B□□□□P25(-01)		
	F3SN-B□□□□P40(-01)		
	F3SN-B□□□□P70(-01)		
	F3SH-A09P03(-01)	F39-HSH09A-03	F39-HSH09B-03



Note: Operating range will decrease substantially. Refer to *Ratings and Performance* on page 9 for details.

Environment-resistant Enclosure (A Package of a Pipe, Gasket, and Bracket; see note)




Appearance	Applicable sensor	Model
	F3SN-A□□□□P14(-01)	F39-HP□□□□-14
	F3SN-A□□□□P25(-01)	F39-HP□□□□-25
	F3SN-A□□□□P40(-01)	
	F3SN-A□□□□P70(-01)	
	F3SN-B□□□□P25(-01)	
	F3SN-B□□□□P40(-01)	
	F3SN-B□□□□P70(-01)	
	F3SH-A09P03(-01)	F39-HPH09-03

Note: Purchase 2 sets when using both an emitter and a receiver.

Multi-beam Sensor Support Stand/Mirror Stand


Appearance	Specification	Model	Remarks
	Stand unit Materials Base: STKM (base) SUS304 (leaf spring) Pipe, bolts and nuts: SUS304 Weight: 11.8 kg	F39-ST1	Minimum order quantity: 1 pc. (In total, 2 stands are required for each F3SH-A: one for the emitter and the other for the receiver.)
	Mounting bracket Materials: Aluminum Weight: 250 g	F39-L22	Minimum order quantity: 1 pc. (In total, 6 brackets are required for each F3SH-A: 3 units each for emitter and receiver. These brackets are not required for the F39-MLG series reflection mirrors, since these mirrors are supplied together with a specially designed adapter.)

Mounting Bracket for Sensor (Optional)

Appearance	Specification	Model	Remarks
	Wall mounting bracket Material: Iron (zinc plating) (see note)	F39-L18	For emitter: 2 pcs. For receiver: 2 pcs. Total: 4pcs./set
	Free-location bracket Materials: Zinc die-cast (zinc plating) Note: Not provided with an angle deflection mechanism for beam control.	F39-L19	Minimum order quantity: 1 pc.
	Free-location bracket Materials Sensor fixing element: Zinc die-cast (zinc plating) Mounting bracket: Iron (zinc plating) Note: Provided with an angle deflection mechanism for beam control	F39-L20	Minimum order quantity: 1 pc.

Note: Use these brackets for sensors having an operating range where no intermediate bracket is required (with an operating range of less than 640 mm)

Test Rod (Optional)

Appearance	Applicable sensor	Specification	Model
	F3SN-A□□□□P14(-01)	14 mm-dia. (provided with the sensor)	F39-TR14
		Used for checking the setting condition of single-beam floating blanking	F39-TR23
		Used for checking the setting condition of two-beam floating blanking	F39-TR32
	F3SN-A□□□□P25(-01)	25 mm-dia. (provided with the sensor)	F39-TR25 (see note 1)
		Used for checking the setting condition of single-beam floating blanking	F39-TR40 (see note 2)

Note: 1. Also provided with the F3SN-B□□□□P25.
2. Also provided with the F3SN-A□□□□P40 and F3SN-B□□□□P40.

Safety Light Curtain

: F3SN-B□□□□P□□ safety light curtains are also available.

F3SN-A□□□□P14(-01)

Model	Protective height	Number of beams
F3SN-A0189P14(-01)	189	21
F3SN-A0207P14(-01)	207	23
F3SN-A0225P14(-01)	225	25
F3SN-A0243P14(-01)	243	27
F3SN-A0261P14(-01)	261	29
F3SN-A0279P14(-01)	279	31
F3SN-A0297P14(-01)	297	33
F3SN-A0315P14(-01)	315	35
F3SN-A0333P14(-01)	333	37
F3SN-A0351P14(-01)	351	39
F3SN-A0369P14(-01)	369	41
F3SN-A0387P14(-01)	387	43
F3SN-A0405P14(-01)	405	45
F3SN-A0423P14(-01)	423	47
F3SN-A0441P14(-01)	441	49
F3SN-A0459P14(-01)	459	51
F3SN-A0477P14(-01)	477	53
F3SN-A0495P14(-01)	495	55

Model	Protective height	Number of beams
F3SN-A0513P14(-01)	513	57
F3SN-A0531P14(-01)	531	59
F3SN-A0549P14(-01)	549	61
F3SN-A0567P14(-01)	567	63
F3SN-A0585P14(-01)	585	65
F3SN-A0603P14(-01)	603	67
F3SN-A0621P14(-01)	621	69
F3SN-A0639P14(-01)	639	71
F3SN-A0657P14(-01)	657	73
F3SN-A0675P14(-01)	675	75
F3SN-A0693P14(-01)	693	77
F3SN-A0711P14(-01)	711	79
F3SN-A0729P14(-01)	729	81
F3SN-A0747P14(-01)	747	83
F3SN-A0765P14(-01)	765	85
F3SN-A0783P14(-01)	783	87
F3SN-A0801P14(-01)	801	89
F3SN-A0819P14(-01)	819	91

Model	Protective height	Number of beams
F3SN-A0837P14(-01)	837	93
F3SN-A0855P14(-01)	855	95
F3SN-A0873P14(-01)	873	97
F3SN-A0891P14(-01)	891	99
F3SN-A0909P14(-01)	909	101
F3SN-A0927P14(-01)	927	103
F3SN-A0945P14(-01)	945	105
F3SN-A0963P14(-01)	963	107
F3SN-A0981P14(-01)	981	109
F3SN-A0999P14(-01)	999	111
F3SN-A1017P14(-01)	1017	113
F3SN-A1035P14(-01)	1035	115
F3SN-A1053P14(-01)	1053	117
F3SN-A1071P14(-01)	1071	119
F3SN-A1089P14(-01)	1089	121
F3SN-A1107P14(-01)	1107	123
F3SN-A1125P14(-01)	1125	125

F3SN-A□□□□P25(-01), F3SN-B□□□□P25(-01)

Model	Protective height	Number of beams
F3SN-A0217P25(-01)	217	13
F3SN-A0232P25(-01)	232	14
F3SN-A0247P25(-01)	247	15
F3SN-A0262P25(-01)	262	16
F3SN-A0277P25(-01)	277	17
F3SN-A0292P25(-01)	292	18
F3SN-A0307P25(-01)	307	19
F3SN-A0322P25(-01)	322	20
F3SN-A0337P25(-01)	337	21
F3SN-A0352P25(-01)	352	22
F3SN-A0367P25(-01)	367	23
F3SN-A0382P25(-01)	382	24
F3SN-A0397P25(-01)	397	25
F3SN-A0412P25(-01)	412	26
F3SN-A0427P25(-01)	427	27
F3SN-A0442P25(-01)	442	28
F3SN-A0457P25(-01)	457	29
F3SN-A0472P25(-01)	472	30
F3SN-A0487P25(-01)	487	31
F3SN-A0502P25(-01)	502	32
F3SN-A0517P25(-01)	517	33
F3SN-A0532P25(-01)	532	34
F3SN-A0547P25(-01)	547	35
F3SN-A0562P25(-01)	562	36
F3SN-A0577P25(-01)	577	37
F3SN-A0592P25(-01)	592	38
F3SN-A0607P25(-01)	607	39
F3SN-A0622P25(-01)	622	40
F3SN-A0637P25(-01)	637	41
F3SN-A0652P25(-01)	652	42
F3SN-A0667P25(-01)	667	43
F3SN-A0682P25(-01)	682	44
F3SN-A0697P25(-01)	697	45
F3SN-A0712P25(-01)	712	46
F3SN-A0727P25(-01)	727	47
F3SN-A0742P25(-01)	742	48

Model	Protective height	Number of beams
F3SN-A0757P25(-01)	757	49
F3SN-A0772P25(-01)	772	50
F3SN-A0787P25(-01)	787	51
F3SN-A0802P25(-01)	802	52
F3SN-A0817P25(-01)	817	53
F3SN-A0832P25(-01)	832	54
F3SN-A0847P25(-01)	847	55
F3SN-A0862P25(-01)	862	56
F3SN-A0877P25(-01)	877	57
F3SN-A0892P25(-01)	892	58
F3SN-A0907P25(-01)	907	59
F3SN-A0922P25(-01)	922	60
F3SN-A0937P25(-01)	937	61
F3SN-A0952P25(-01)	952	62
F3SN-A0967P25(-01)	967	63
F3SN-A0982P25(-01)	982	64
F3SN-A0997P25(-01)	997	65
F3SN-A1012P25(-01)	1012	66
F3SN-A1027P25(-01)	1027	67
F3SN-A1042P25(-01)	1042	68
F3SN-A1057P25(-01)	1057	69
F3SN-A1072P25(-01)	1072	70
F3SN-A1087P25(-01)	1087	71
F3SN-A1102P25(-01)	1102	72
F3SN-A1117P25(-01)	1117	73
F3SN-A1132P25(-01)	1132	74
F3SN-A1147P25(-01)	1147	75
F3SN-A1162P25(-01)	1162	76
F3SN-A1177P25(-01)	1177	77
F3SN-A1192P25(-01)	1192	78
F3SN-A1207P25(-01)	1207	79
F3SN-A1222P25(-01)	1222	80
F3SN-A1237P25(-01)	1237	81
F3SN-A1252P25(-01)	1252	82
F3SN-A1267P25(-01)	1267	83
F3SN-A1282P25(-01)	1282	84

Model	Protective height	Number of beams
F3SN-A1297P25(-01)	1297	85
F3SN-A1312P25(-01)	1312	86
F3SN-A1327P25(-01)	1327	87
F3SN-A1342P25(-01)	1342	88
F3SN-A1357P25(-01)	1357	89
F3SN-A1372P25(-01)	1372	90
F3SN-A1387P25(-01)	1387	91
F3SN-A1402P25(-01)	1402	92
F3SN-A1417P25(-01)	1417	93
F3SN-A1432P25(-01)	1432	94
F3SN-A1447P25(-01)	1447	95
F3SN-A1462P25(-01)	1462	96
F3SN-A1477P25(-01)	1477	97
F3SN-A1492P25(-01)	1492	98
F3SN-A1507P25(-01)	1507	99
F3SN-A1522P25(-01)	1522	100
F3SN-A1537P25(-01)	1537	101
F3SN-A1552P25(-01)	1552	102
F3SN-A1567P25(-01)	1567	103
F3SN-A1582P25(-01)	1582	104
F3SN-A1597P25(-01)	1597	105
F3SN-A1612P25(-01)	1612	106
F3SN-A1627P25(-01)	1627	107
F3SN-A1642P25(-01)	1642	108
F3SN-A1657P25(-01)	1657	109
F3SN-A1672P25(-01)	1672	110
F3SN-A1687P25(-01)	1687	111
F3SN-A1702P25(-01)	1702	112
F3SN-A1717P25(-01)	1717	113
F3SN-A1732P25(-01)	1732	114
F3SN-A1747P25(-01)	1747	115
F3SN-A1762P25(-01)	1762	116
F3SN-A1777P25(-01)	1777	117
F3SN-A1792P25(-01)	1792	118
F3SN-A1807P25(-01)	1807	119
F3SN-A1822P25(-01)	1822	120

**F3SN-A□□□□P40(-01),
F3SN-B□□□□P40(-01)**

Model	Protective height	Number of beams
F3SN-A0217P40(-01)	217	7
F3SN-A0247P40(-01)	247	8
F3SN-A0277P40(-01)	277	9
F3SN-A0307P40(-01)	307	10
F3SN-A0337P40(-01)	337	11
F3SN-A0367P40(-01)	367	12
F3SN-A0397P40(-01)	397	13
F3SN-A0427P40(-01)	427	14
F3SN-A0457P40(-01)	457	15
F3SN-A0487P40(-01)	487	16
F3SN-A0517P40(-01)	517	17
F3SN-A0547P40(-01)	547	18
F3SN-A0577P40(-01)	577	19
F3SN-A0607P40(-01)	607	20
F3SN-A0637P40(-01)	637	21
F3SN-A0667P40(-01)	667	22
F3SN-A0697P40(-01)	697	23
F3SN-A0727P40(-01)	727	24
F3SN-A0757P40(-01)	757	25
F3SN-A0787P40(-01)	787	26
F3SN-A0817P40(-01)	817	27
F3SN-A0847P40(-01)	847	28
F3SN-A0877P40(-01)	877	29
F3SN-A0907P40(-01)	907	30
F3SN-A0937P40(-01)	937	31
F3SN-A0967P40(-01)	967	32
F3SN-A0997P40(-01)	997	33
F3SN-A1027P40(-01)	1027	34
F3SN-A1057P40(-01)	1057	35
F3SN-A1087P40(-01)	1087	36
F3SN-A1117P40(-01)	1117	37
F3SN-A1147P40(-01)	1147	38
F3SN-A1177P40(-01)	1177	39
F3SN-A1207P40(-01)	1207	40
F3SN-A1237P40(-01)	1237	41
F3SN-A1267P40(-01)	1267	42
F3SN-A1297P40(-01)	1297	43
F3SN-A1327P40(-01)	1327	44
F3SN-A1357P40(-01)	1357	45
F3SN-A1387P40(-01)	1387	46
F3SN-A1417P40(-01)	1417	47
F3SN-A1447P40(-01)	1447	48
F3SN-A1477P40(-01)	1477	49
F3SN-A1507P40(-01)	1507	50
F3SN-A1537P40(-01)	1537	51
F3SN-A1567P40(-01)	1567	52
F3SN-A1597P40(-01)	1597	53
F3SN-A1627P40(-01)	1627	54
F3SN-A1657P40(-01)	1657	55
F3SN-A1687P40(-01)	1687	56
F3SN-A1717P40(-01)	1717	57
F3SN-A1747P40(-01)	1747	58
F3SN-A1777P40(-01)	1777	59
F3SN-A1807P40(-01)	1807	60

**F3SN-A□□□□P70(-01),
F3SN-B□□□□P70(-01)**

Model	Protective height	Number of beams
F3SN-A0277P70(-01)	277	5
F3SN-A0337P70(-01)	337	6
F3SN-A0397P70(-01)	397	7
F3SN-A0457P70(-01)	457	8
F3SN-A0517P70(-01)	517	9
F3SN-A0577P70(-01)	577	10
F3SN-A0637P70(-01)	637	11
F3SN-A0697P70(-01)	697	12
F3SN-A0757P70(-01)	757	13
F3SN-A0817P70(-01)	817	14
F3SN-A0877P70(-01)	877	15
F3SN-A0937P70(-01)	937	16
F3SN-A0997P70(-01)	997	17
F3SN-A1057P70(-01)	1057	18
F3SN-A1117P70(-01)	1117	19
F3SN-A1177P70(-01)	1177	20
F3SN-A1237P70(-01)	1237	21
F3SN-A1297P70(-01)	1297	22
F3SN-A1357P70(-01)	1357	23
F3SN-A1417P70(-01)	1417	24
F3SN-A1477P70(-01)	1477	25
F3SN-A1537P70(-01)	1537	26
F3SN-A1597P70(-01)	1597	27
F3SN-A1657P70(-01)	1657	28
F3SN-A1717P70(-01)	1717	29
F3SN-A1777P70(-01)	1777	30

Ratings and Performance (For details, refer to the instruction manual.)

■ Main Unit F3SN-A/F3SH-A

Model	Stand-alone	F3SN-A□□□□P14 (see note 1)	F3SN-A□□□□P25 (see note 1)	F3SN-A□□□□P40 (see note 1)	F3SN-A□□□□P70 (see note 1)	F3SH-A09P03
Item	Series connection	F3SN-A□□□□P14-01 (see notes 1 and 2)	F3SN-A□□□□P25-01 (see note 1)	F3SN-A□□□□P40-01 (see note 1)	F3SN-A□□□□P70-01 (see note 1)	F3SH-A09P03-01
Sensor type	Type 4 Safety Light Curtain					
Applicable safety category	4, 3, 2, 1, B					
Operating range	0.2 to 7 m		0.2 to 10 m			
Beam gap (P)	9 mm		15 mm		30 mm	
Number of beams (n)	21 to 125 (odd numbers only)		13 to 120		7 to 60	
Protective height (PH)	189 to 1125 mm PH = n × P		217 to 1822 mm PH = (n - 1) × P + 37		217 to 1807 mm PH = (n - 1) × P + 37	
Outermost beam gap						900 mm
Detection capability	Non-transparent: 14 mm in diameter		Non-transparent: 25 mm in diameter		Non-transparent: 40 mm in diameter	
Effective aperture angle (EAA)	Within ±2.5° for the emitter and receiver at a detection distance of at least 3 m according to IEC 61496-2					
Light source (luminous wavelength)	Infrared LED (870 nm)					
Supply voltage (Vs)	24 VDC ±10% (ripple p-p 10% max.)					
Current consumption (under no-load conditions)	Emitter	Up to 50 beams: 140 mA max., 51 to 85 beams: 155 mA max., 86 beams and more: 170 mA max.				140 mA max.
	Receiver	Up to 50 beams: 100 mA max., 51 to 85 beams: 110 mA max., 86 beams and more: 120 mA max.				100 mA max.
OSSD	Two PNP transistor outputs, load current 300 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)					
Auxiliary output (non-safety output)	One PNP transistor output, load current 50 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)					
External indicator output (non-safety output) (see note 3)	One PNP transistor output, load current 40 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)					
Output operation mode	OSSD output: Light-ON Auxiliary output: Dark-ON (can be changed by the F39-MC11) External indicator output: Light-ON (can be changed by the F39-MC11) (see note 3)					
Input voltage	For test input, interlock selection input, reset input, and external relay monitor input voltages; ON voltage: 9 to 24 V (with a sink current of 3 mA max.), OFF voltage: 0 to 1.5 V or open					
Test functions	<ul style="list-style-type: none"> • Self-test (after power ON, and during operation, one cycle during response time) • External test (light emission stop function by test input) 					
Mutual interference prevention function (see note 3)	<ul style="list-style-type: none"> • Time-shared beam projection system by series connection • Number of series connected light curtains: Up to 3 sets • Number of beams: Up to 240 beams • Length of the series connection cable: 3 m max. 					
Safety-related functions	<ul style="list-style-type: none"> • Auto reset/manual reset (interlock) (see note 4) • EDM (External Device Monitoring) • Fixed blanking (see note 5) • Floating blanking (see note 5) 					<ul style="list-style-type: none"> • Auto reset mode/manual reset mode (interlock) (see note 4) • EDM (External Device Monitoring)
Protection	Output short-circuit protection, reverse polarity protection					
Response time (under stable light incident condition)	ON to OFF: 10 to 15.5 ms max. OFF to ON: 40 to 62 ms max. Refer to page 28 for details.					ON to OFF: 10 ms max. OFF to ON: 40 ms max.
Startup waiting time	1 s max.					
Ambient light intensity	Incandescent lamp: 3000 lx max. (light intensity on the receiver surface) Sunlight: 10000 lx max. (light intensity on the receiver surface)					
Ambient temperature	Operating: -10 to +55 °C, storage: -30 to +70 °C (with no icing or condensation)					
Ambient humidity	Operating/storage: 35 to 95% RH (with no condensation)					
Insulation resistance	20 MΩ min. (at 500 VDC)					
Dielectric strength voltage	1000 VAC 50/60 Hz 1 min.					
Vibration resistance (malfunction)	10 to 55 Hz, double amplitude: 0.7 mm, X, Y and Z directions: 20 sweeps					
Shock resistance (malfunction)	100 m/s ² , X, Y and Z directions: 1000 times					
Degree of protection	IP65 (IEC60529)					
Connection method	M12 connector (8 pins)					
Weight (in packaging)	Calculate with the following equation: Weight of light curtain with protective height of 189 mm to 738 mm: (g) = (Protective height + 100) × 2 + 1300 Weight of light curtain with protective height of 747 mm to 1402 mm: (g) = (Protective height + 100) × 2 + 1700 Weight of light curtain with protective height of 1417 mm to 1822 mm: (g) = (Protective height + 100) × 2 + 2100					
Materials	Case: Aluminum, cap: Zinc die-cast, optical cover: PMMA (acrylic resin)					
Accessories	Test rod (see note 6), instruction manual, error mode label, mounting brackets (top and bottom), mounting brackets (intermediate) (see note 7)					
Applicable standard	IEC61496-1, EN61496-1 Type 4 ESPE (Electro-Sensitive Protective Equipment) IEC61496-2 Type 4 AOPD (Active Opto-electronic Protective Devices)					

-
- Note:** 1. The 4 digits in □□□□ in the model number represent the protective height. Use the formula given in the information on protective height specifications to calculate the height.
For example, if the beam gap is 9 mm, and the No. of beams is 21, the protective height will be $9 \times 21 = 189$ mm. The model with this protective height is F3SN-A0189P14.
2. F3SN-A□□□□P14-01 is a customized model. Consult with your dealer or OMRON representative when ordering this model.
 3. Models ending in -01 only.
 4. For the factory setting, the manual reset mode is set to the "start/restart" interlock.
Using the F39-MC11 can select either the start interlock or the restart interlock.
 5. For the factory setting, the function is not set. It can be enabled with the F39-MC11.
 6. Not provided with the F3SN-A□□□□P70 and F3SH-A.
 7. The intermediate mounting bracket is supplied with the following types:
Types which have the total length of the light curtain from 640 mm to 1280 mm: 1 set for each of emitter and receiver.
Types which have the total length of the light curtain over 1280 mm: 2 sets for each of emitter and receiver.

F3SN-B () Different from specifications of F3SN-A)

Item	Model	F3SN-B P25	F3SN-B P40	F3SN-B P70
Sensor type		Type 2 Safety Light Curtain		
Applicable safety category		2, 1, B		
Operating range		0.2 to 10.0 m		
Beam gap (P)		15 mm	30 mm	60 mm
Number of beams (n)		13 to 119 (noncontinuous)	7 to 60 (noncontinuous)	5 to 30
Protective height (PH) (PH = (n - 1) × P + 37)		217 to 1807 mm	217 to 1807 mm	277 to 1777 mm
Detection capability		Non-transparent: 25 mm in diameter	Non-transparent: 40 mm in diameter	Non-transparent: 70 mm in diameter
Effective aperture angle (EAA) (beam spread angle)		Within ±5° for the emitter and receiver at a detection distance of at least 3 m according to IEC 61496-2		
Light source (luminous wavelength)		Infrared LED (870 nm)		
Supply voltage (Vs)		24 VDC ±10% (ripple p-p 10% max.)		
Current consumption (under no-load conditions)	Emitter	Up to 50 beams: 140 mA max., 51 to 85 beams: 155 mA max., 86 beams and more: 170 mA max.		
	Receiver	Up to 50 beams: 100 mA max., 51 to 85 beams: 110 mA max., 86 beams and more: 120 mA max.		
OSSD (see note 1)		Two PNP transistor outputs, load current 300 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)		
Auxiliary output (non-safety output)		One PNP transistor output, load current 50 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)		
Output operation mode (see note 1)		OSSD output: Light-ON, Auxiliary output: Dark-ON		
Input voltage		For test input, interlock selection input, reset input, and external relay monitor input voltages; ON voltage: 9 to 24 V (with a sink current of 3 mA max.), OFF voltage: 0 to 1.5 V or open		
Test functions		<ul style="list-style-type: none"> • Self-test (when power is ON and period is 1 s or less) • External test (light emission stop function by test input) 		
Safety-related functions (see notes 2 and 3)		<ul style="list-style-type: none"> • Auto reset/manual reset (start/restart interlock) • EDM (External Device Monitoring) 		
Protection		Output short-circuit protection, reverse polarity protection		
Response time (under stable light incident condition)		ON to OFF: 10 to 15 ms max. OFF to ON: 40 to 60 ms max. Refer to page 28 for details.		
Startup waiting time		1 s max.		
Ambient light intensity		Incandescent lamp: 3000 lx max. (light intensity on the receiver surface) Sunlight: 10000 lx max. (light intensity on the receiver surface)		
Ambient temperature		Operating: -10 to +55 °C, storage: -30 to +70 °C (with no icing or condensation)		
Ambient humidity		Operating/storage: 35 to 95% RH (with no condensation)		
Insulation resistance		20 MΩ min. (at 500 VDC)		
Dielectric strength voltage		1000 VAC 50/60 Hz 1 min.		
Vibration resistance (malfunction)		10 to 55 Hz, double amplitude: 0.7 mm, X, Y and Z directions: 20 sweeps		
Shock resistance (malfunction)		100 m/s ² , X, Y and Z directions: 1000 times		
Degree of protection		IP65 (IEC60529)		
Connection method		M12 connector (8 pins)		
Weight (in packaging)		Calculate with the following equation: Weight of light curtain with protective height of 180 mm to 738 mm: (g) = (Protective height + 100) × 2 + 1300 Weight of light curtain with protective height of 747 mm to 1402 mm: (g) = (Protective height + 100) × 2 + 1700 Weight of light curtain with protective height of 1417 mm to 1822 mm: (g) = (Protective height + 100) × 2 + 2100		
Materials		Case: Aluminum, cap: Zinc die-cast, optical cover: PMMA (Acrylic resin)		
Accessories		Test rod (see note 4), instruction manual, mounting brackets (top and bottom), mounting brackets (intermediate) (see note 5), error mode label		
Use of setting console		Not permitted		
Applicable standard		IEC61496-1, EN61496-1 Type 2 ESPE (Electro-Sensitive Protective Equipment) IEC61496-2 Type 2 AOPD (Active Opto-electronic Protective Devices)		

- Note:**
1. A safety circuit has been adopted. Please note that the control logic (ON/OFF) may differ from conventionally used logic.
 2. The manual reset mode is set to the "start/restart" interlock. It is impossible to select interlock only or restart interlock only.
 3. No floating blanking or fixed blanking function is provided.
 4. Not provided with the F3SN-B P70.
 5. The intermediate mounting bracket is supplied with the following types:
Types which have the total length of the light curtain from 640 mm to 1280 mm: 1 set for each of emitter and receiver.
Types which have the total length of the light curtain over 1280 mm: 2 sets for each of emitter and receiver.

■ Accessories

Control Unit

Item	Model	F3SP-B1P	G9SA-300-SC (See note)
Applicable sensor		F3SN-A, F3SN-B, F3SH-A	
Supply voltage		24 VDC ±10%	
Power consumption		1.7 W DC max. (does not include the sensor's current consumption)	24 VDC: 0.7 WDC max. (does not include the sensor's current consumption)
Operating time		100 ms max. (does not include the sensor's response time)	300 ms max. (does not include the sensor's response time and bouncetime)
Response time		10 ms max. (does not include the sensor's response time)	10 ms max. (does not include the sensor's response time and bouncetime)
Relay output	No. of contact	3 NO + 1 NC	3 NO
	Rated load	25 VAC, 5 A (cos diameter = 1), 30 VDC, 5 A L/R = 0 ms	250 VAC, 5 A
	Rated carry voltage	5 A	
Connection method	Between sensor's	M12 connector (8 pins)	
	Other	Terminal block	
Weight (in packaging)		Approx. 280 g	Approx. 300 g
Accessory		Instruction manual	

Note: For further details on the G9SA-300-SC, refer to the G9SA catalogue (Cat. No: J123-E1-01).

Muting Controller

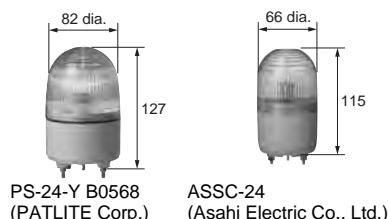
Item	Model	F3SP-U2P
Safety category		Up to category 4.
Number of connectable light curtains		Up to 2 sets (see note 1)
Supply voltage		24 VDC ±10% (ripple p-p 10% max.)
Power consumption		8 W max. (does not include muting lamp and sensor) (see note 2)
Response time		30 ms max.
Connectable light curtain		All curtains of the F3SN, F3SH, F3SL, and F3SS models made by OMRON
Output		2 NO contacts, 250 VAC, 2.5 A max.
Input		Test input: NC contact, reset input: NO contact, Muting sensor input: PNP transistor type or NO contact type; 4 sets max.
Indicators		Output indicator lamp (red/green LED): Red LED will illuminate when output is OFF, while green LED will illuminate when output is ON. Input indicator lamp (4 green LEDs): Green LED will illuminate when 24 V is applied. Status display (1 digit with 7 segments): Status of the F3SP is displayed.
Test functions		Self-test (after power ON, and during operation), external test (by test input)
Safety-related functions		Auto reset/manual reset (interlock), muting function, override function
Applicable muting lamp		Incandescent lamp, 24 VDC, 3 to 7 W (see notes 1 and 2)
Ambient temperature		Operating: -10 to +50 °C, storage: -30 to +70 °C (with no icing or condensation)
Ambient humidity		15 to 95% RH (with no condensation)
Degree of protection		IP20 (IEC60529)
Vibration resistance (malfunction)		10 to 55 Hz, double amplitude: 0.7 mm, X, Y and Z directions: 20 sweeps
Shock resistance (malfunction)		100 m/s ² , X, Y and Z directions: 1000 times
Weight (in packaging)		Approx. 870 g
Accessory		Instruction manual

Note: 1. The total power consumption should not exceed 24 W, the rating of the fuse (self-reset type) used in the F3SP.

- Light Curtain
- Muting lamp: 3 to 7 W
- Single unit of F3SP (excluding load current): The number of controllers multiplied by 8 W should not exceed 24 W.

2. Use of muting lamp is required even when no muting function is used. The following lamps are recommended (both lamps have the same power consumption: 5 W)

- Model PS-24-Y B0568 lamp made by PATLITE Corp. (For replacing the lamp, be sure to use an incandescent lamp. LED lamp will disable the current-detection type failure monitoring system.)
- Model ASSC-24 lamp made by Asahi Electric Co., Ltd.



Setting Console

Item	Model	F39-MC11
Applicable sensor	F3SN-A, F3SH-A	
Supply voltage	24 VDC ±10% (provided from the sensor)	
Connection method	Cable (included)	
Weight (in packaging)	360 g	
Accessories	One branching connector, 2-m cable, one connector cap, instruction manual	

For details on the setting console, refer to the instruction manual provided with the product.

External Indicator

Item	Model	F39-A01PR-L (Emitter) F39-A01PR-D (Receiver)	F39-A01PG-L (Emitter) F39-A01PG-D (Receiver)
Applicable sensor	F3SN-A□□□□P□□-01, F3SN-B□□□□P□□-01, F3SH-A09P03-01		
Light source	Red LED	Green LED	
Supply voltage	24 VDC ±10% (provided from the sensor)		
Current consumption	50 mA max. (provided from the sensor)		
Connection method	M12 connector (8 pins)		
Weight (in packaging)	Approx. 80 g		

Spatter Protection Slit Cover

Item	Model	F39-HS□□□□A-14	F39-HS□□□□B-14	F39-HS□□□□A-25 F39-HSH09A-03	F39-HS□□□□B-25 F39-HSH09B-03
Applicable sensor	F3SN-A□□□□P14(-01)		F3SN-A□□□□P□□(-01), F3SN-B□□□□P□□(-01), F3SH-A09P03(-01)		
Operating range (typical value) (see note)	When one cover is used	3 m	2 m	5.5 m	3.5 m
	When two covers are used	1 m	0.5 m	2 m	1 m
Distance that does not cause mutual interference (typical value)	When one cover is used	6.5 m	4.8 m	12.2 m	7.8 m
	When two covers are used	2.4 m	1.2 m	4.4 m	2.1 m

Note: The maximum distance that can turn ON all of the five light intensity level indicators.

Environment-resistant Enclosure

Item	Model	F39-HP□□□□-14	F39-HP□□□□-25 F39-HPH09-03
Applicable sensor	F3SN-A□□□□P14(-01)		F3SN-A□□□□P□□(-01), F3SN-B□□□□P□□(-01), F3SH-A09P03(-01)
Operating range characteristics	0.2 to 6 m		0.2 to 10 m
Degree of protection (see note)	IP67 (IEC60529)		
Materials	Case: Acrylic resin, rubber: NBR60, mounting bracket: SUS316L, screw: SUS316L		

Note: To conform to IP67, tighten the screws according to the "Cautions for Use" as described in the manual packaged together with the product.

Safety-related Functions

Interlock Function

The auto reset mode and the manual reset mode are wire selectable features of the F3SN-A/F3SN-B/F3SH-A.

Auto reset mode

After the power is turned ON and none of the beams are interrupted, the OSSD (Output Signal Switching Device) outputs will go to their ON-state.

Manual reset mode

For the factory setting, the start/restart interlock is selected in the manual reset mode. When the light curtain enters the interlock condition, it keeps the OSSD outputs in the OFF-state. Even if all beams become free, the OSSD outputs will not go to the ON-state. When none of the beams are interrupted in the detection zone, applying the reset input resets the interlock condition and the OSSD outputs go to the ON-state.

- Start/restart interlock
After the power is turned ON, or when at least one beam is interrupted, the light curtain enters the interlock condition.
- Start interlock
Only after power ON, the light curtain enters the interlock condition.
- Restart interlock
Only when at least one beam is interrupted, the light curtain enters the interlock condition.

Diagnostic Functions

Self-test

After power ON, the F3SN-A/F3SN-B/F3SH-A performs a complete self-test within 1 second. In addition, it performs a self-test (within response time) periodically during operation.

External Test

This function stops the emission of light from the light curtain using an external signal and checks that the light curtain operates properly.

Lockout Condition

If an error is detected by the self-test, the light curtain enters the lockout condition, keeps the OSSD outputs in their OFF state and displays the error mode. Lockout condition can be cleared either by resetting the power or by changing the setting of the reset switch from closed to open (open to closed for auto-reset). (With some errors, the lockout condition is automatically reset when the light curtain confirms that the cause of the error has been removed.)

Fixed Blanking Function (F3SN-A only)

This function is set with the F39-MC11 setting console.

This is a function provided to disable a specific area of the light curtain's detection zone. Fixed blanking can be set for any desired number of beams. If an object enters the disabled detection zone, the OSSD outputs status will not change. This function is used when there is a stationary object in the detection zone that needs to be ignored.

Floating Blanking Function (F3SN-A only)

This function is set with the F39-MC11 setting console.

During normal operation when floating blanking is disabled, and at least one beam is interrupted, the light curtain will go to the OFF-state. However, using this function prevents the light curtain from going to the OFF-state until multiple beams (see notes 1, 2 and 3) are interrupted.

- Note:**
1. The number of the floating blanking beams can be selected in the range of 1 to 3 beams.
 2. This function can be set to be active only if the interrupted beams are adjacent to each other.
 3. This function can be set so that the top and bottom beams cannot be set for the function.

EDM (External Device Monitoring)

This function monitors the state of the NC contacts. Connect the NC contact of the MPCEs to the EDM input line of the receiver. If the correct logical relationship between the OSSD outputs and the EDM input is not kept, the light curtain immediately enters the lockout condition and the OSSD outputs will go to their OFF-state.

The light curtain's normal operation is up to 300 ms max. (see note), this allows for the delay time caused by the release of the MPCEs.

To ensure the correct usage of this function, the MPCEs must be safety-approved types with forcibly-guided contacts.

When the EDM is not used

In the case the EDM input is not used, connect the auxiliary output in the Dark-ON output mode to the EDM input line, or disable the EDM with the F39-MC11 setting console.

- Note:** The value can be changed by the F39-MC11.
(It is impossible to connect the F39-MC11 to the F3SN-B.)

Non-safety Output

Auxiliary Output

The default of this output is the reverse signal of the safety outputs (Dark-ON output). This output can be used for monitoring purposes by connecting it to a device such as a PLC.

The auxiliary output can be selected to give one of the following output operation modes by the F39-MC11. (No selection can be made by the F3SN-B.)

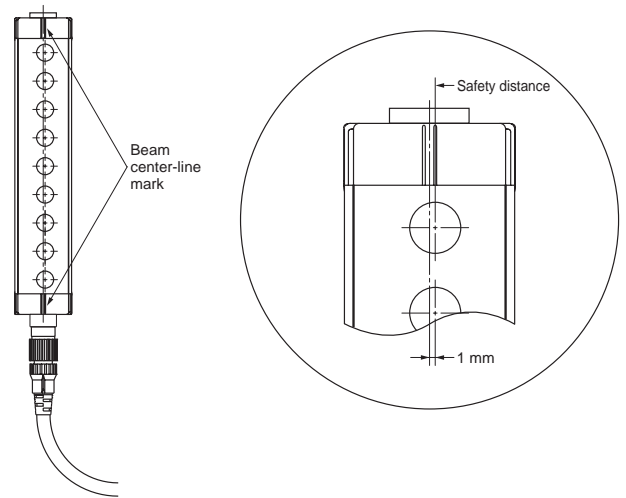
- Dark-ON output mode (fixed for the F3SN-B)
- Light-ON output mode
- Light diagnosis mode
- Lockout mode
- Outermost-beam monitoring mode
- Specified-beam mode
- Blanking monitoring mode (F3SN-A only)

External Indicator Output (Series-Connection model only)

This output can be connected to an external indicator to display one of the operation modes as selected by the F39-MC11. The default of this output is Light-ON output. A desired output operation mode can be selected by using the F39-MC11. (Only default mode (Light-ON) is available with F3SN-B)

Beam Center-line

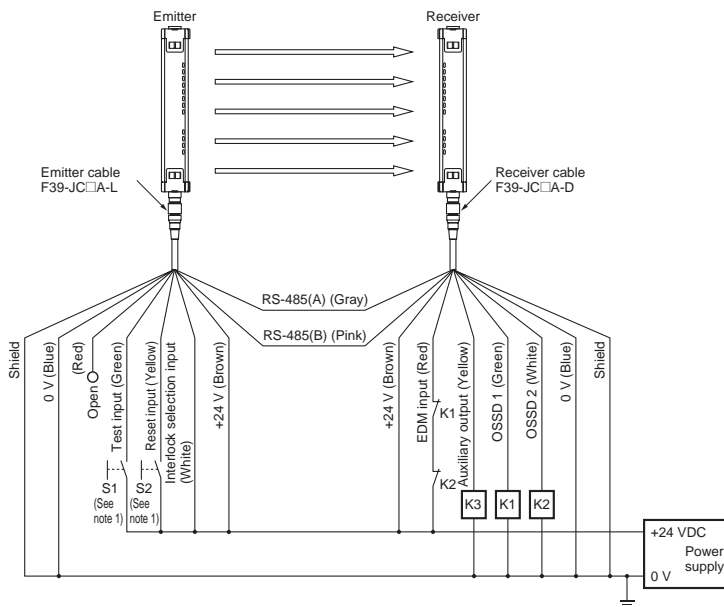
The beam center-line is the line going through all of the beams. (See diagram below.) This position is a reference line for measuring safety distance. Use the line closer to the hazardous area as a reference line for the safety distance.



Wiring Diagram

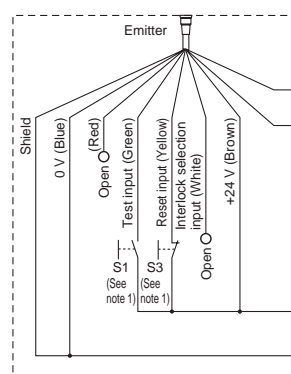
Wiring for Sensor Only Configuration

Wiring for the Manual reset mode and the EDM function



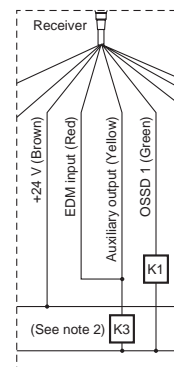
- S1: External test switch
- S2: Interlock/lockout reset switch
- S3: Lockout reset switch (If the switch is not necessary, connect between the reset input and +24 VDC.)
- K1, K2: Relay that control the dangerous zone, etc.
- K3: Load, PLC, etc. (used for monitoring)

Wiring for the Auto Reset Mode



When the EDM is Not Used

- When the EDM is not necessary
- (1) Use the F39-MC11 to disable the EDM.
 - or
 - (2) Disable the EDM by changing the wiring as shown in the figure below, when the auxiliary output is Dark ON.

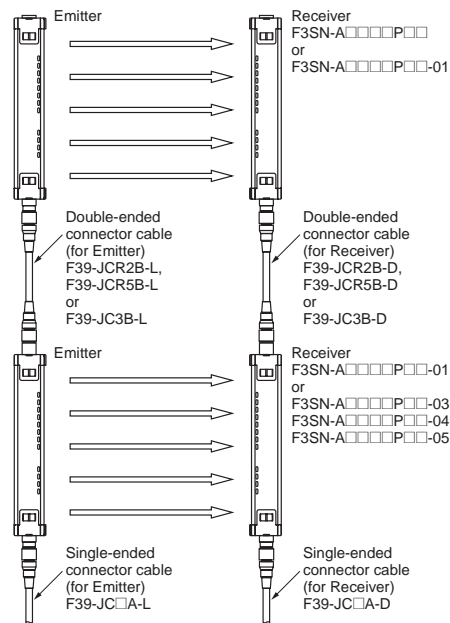


- Note:**
1. Use very low load type switches.
 2. If K3 is not necessary, short-circuit the auxiliary output with the EDM input.

Series Connection (Up to 3 Sets)

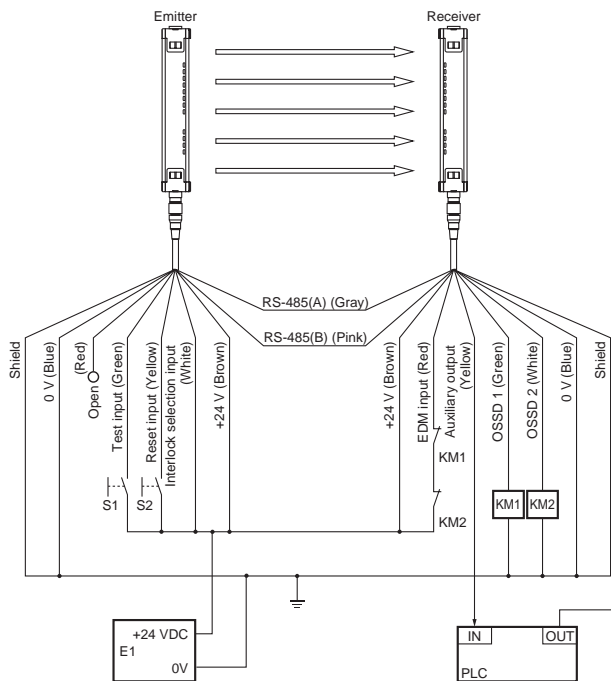
Use of series connection type (model ending in -01, -03, -04, -05) enables series connection as shown in the figure at right. Both the stand-alone type and the series connection type can be used for the light curtains located at the top end.

- Note:**
1. In order to maintain performance characteristics, use the F39-JCR2B, F39-JCR5B or the F39-JC3B to connect light curtains in series connection. The F39-JC7B, F39-JC10B, or F39-JC15B cannot be connected in series.
 2. The F3SN and F3SH cannot be connected in series.
 3. Model ending in -03 or -04 has a 0.2 m cable connector. Series connection without double-ended connector cables is possible.



An Example of Safety Circuits Where No Controller is Used

For category 4 rating (F3SN-A, F3SH-A)/category 2 rating (F3SN-B)



Applicable operation mode

- Manual reset mode
- Using the EDM function

S1: External test switch

S2: Interlock/lockout reset switch

KM1, KM2: Safety relay with forcibly-guided contacts (G7SA) or magnetic contactor

KM3: Solid-state contactor (G3J)

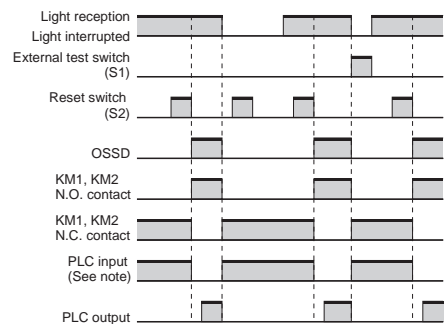
M: 3-phase motor

E1: 24 VDC power supply (S82K)

PLC: Programmable controller

(Used for monitoring. This is not a part of a safety system.)

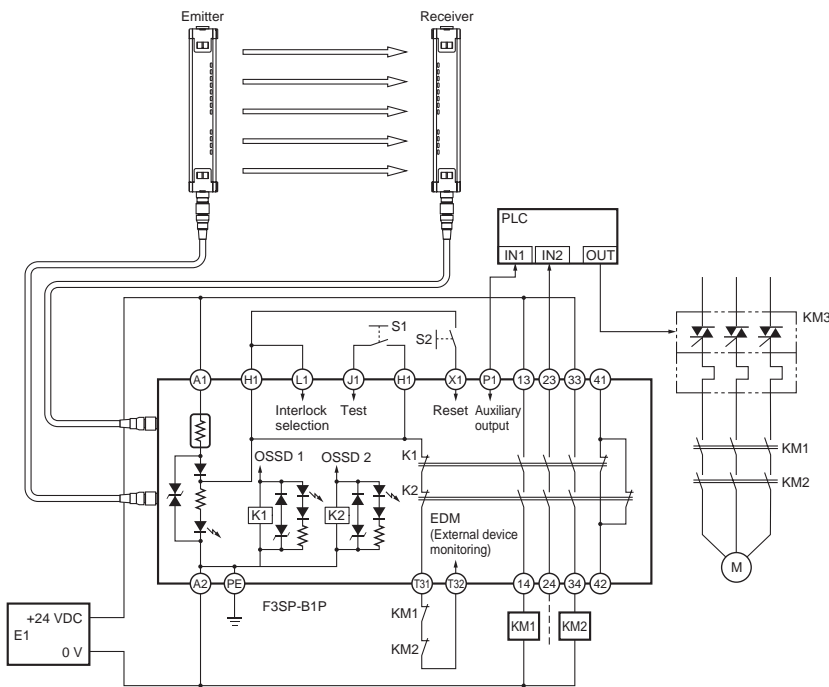
Timing Chart



Note: The output operation mode of the auxiliary output is the Dark-ON output mode.

An Example of Safety Circuits Where the F3SP-B1P Controller is Used

For category 4 rating (F3SN-A, F3SH-A)/category 2 rating (F3SN-B)



Applicable operation mode

- Manual reset mode

S1: External test switch

S2: Interlock/lockout reset switch

S3: Lockout reset switch (If the switch is not necessary, connect between X1 and H1.)

KM1, KM2: Magnetic contactor (LP1D)

KM3: Solid-state contactor (G3J)

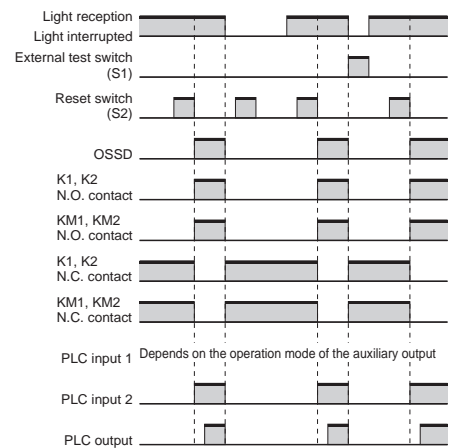
M: 3-phase motor

E1: 24 VDC power supply (S82K)

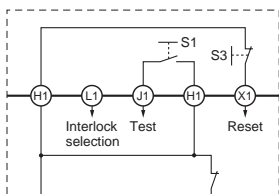
PLC: Programmable controller

(Used for monitoring. This is not a part of a safety system.)

Timing Chart

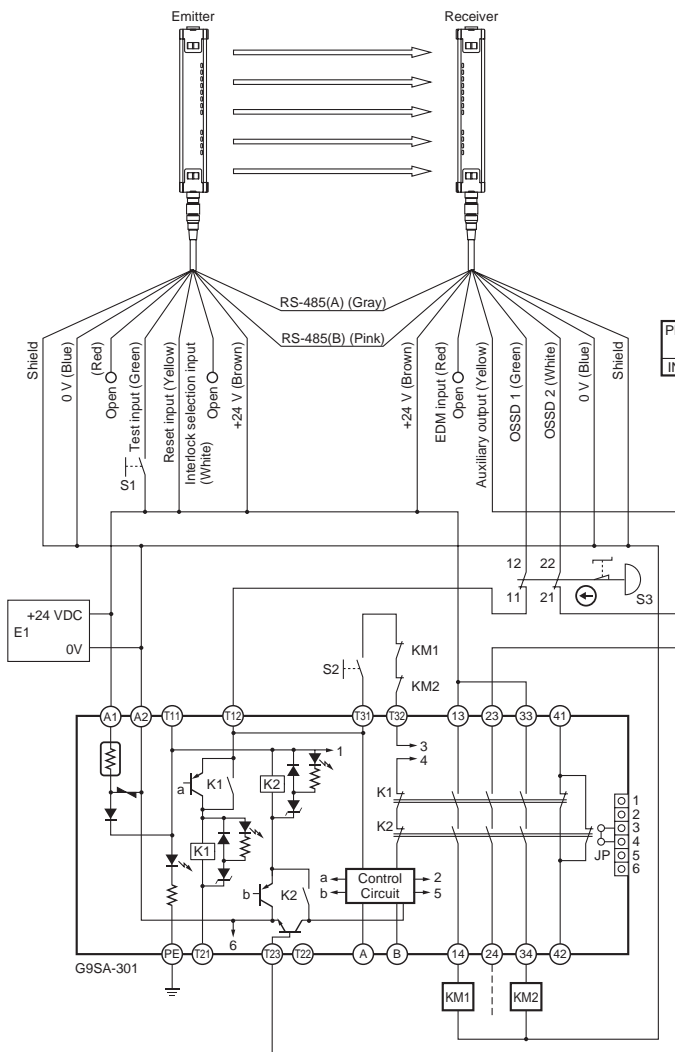


Wiring for the Auto reset mode



- Note:**
1. If the EDM is not necessary, short-circuit T31 and T32.
 2. For the number and arrangement of all terminals on the F3SP-B1P, see the instruction manual packaged together with the F3SP-B1P.

An Example of Safety Circuits Where the G9SA-301 Safety Relay Unit is Connected For category 4 rating (F3SN-A, F3SH-A)/category 2 rating (F3SN-B)

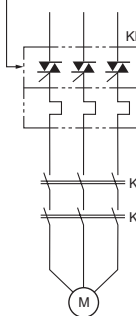


Applicable operation mode

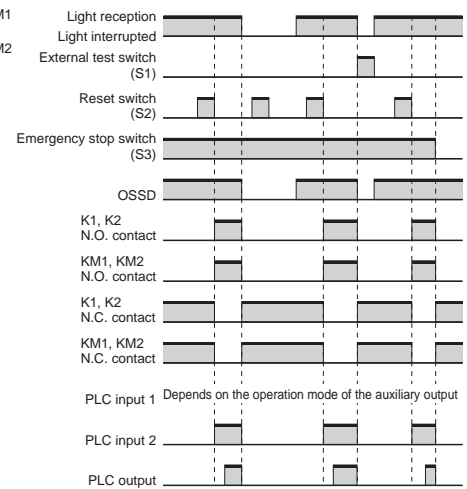
- For sensor
 - Auto reset mode
 - Disable the EDM monitor function (by setting on the F39-MC11, see note 1)
- For safety relay unit
 - Manual reset mode
 - Use the feedback loop
- Use the emergency stop switch (see note 2)

Note: 1. The F39-MC11 setting console cannot be connected to the F3SN-B. Therefore, short-circuit the auxiliary output terminal and the EDM input.

2. If emergency stop switch is not necessary, connect the OSSD 1 directly to T12 terminal and connect the OSSD 2 directly to T23 terminal.



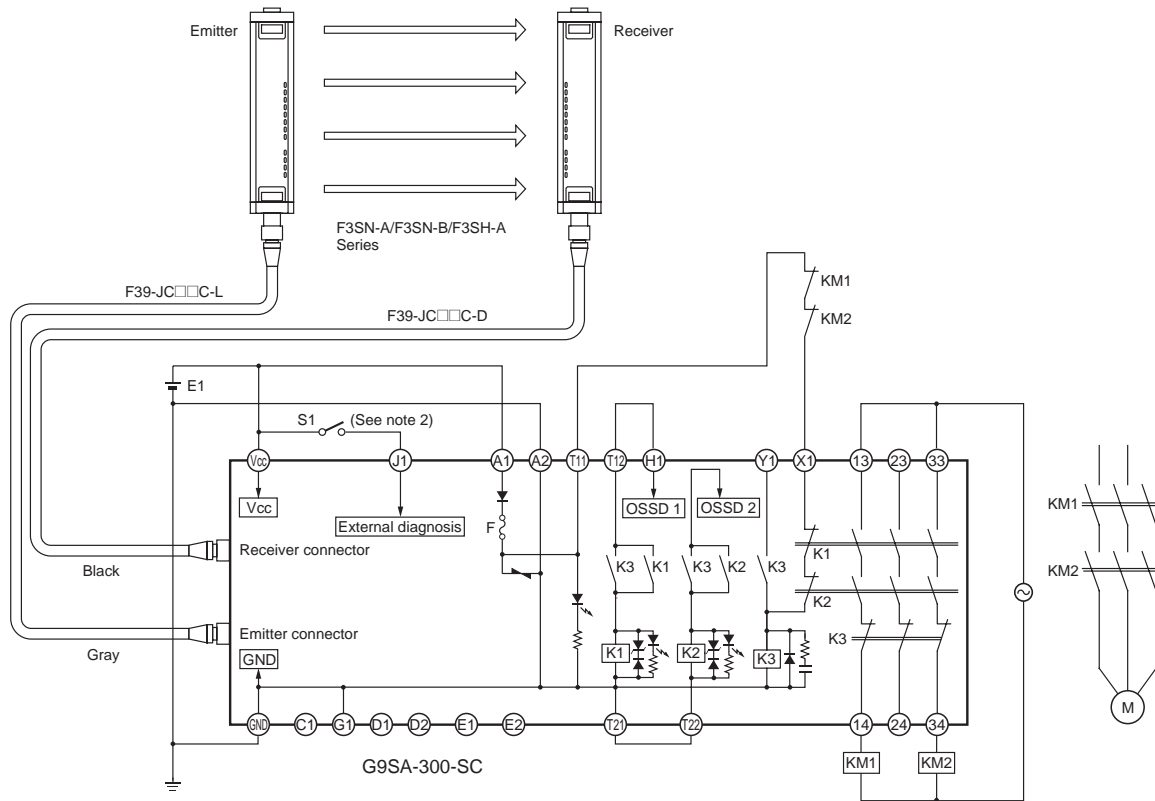
Timing Chart



- S1: External test switch
- S2: Reset switch
- S3: Emergency stop switch (positive opening mechanism) (A165E or A22E)
- KM1, KM2: Magnetic contactor (LP1D)
- KM3: Solid-state contactor (G3J)
- M: 3-phase motor
- E1: 24 VDC power supply (S82K)
- PLC: Programmable controller (Used for monitoring. This is not a part of a safety system.)

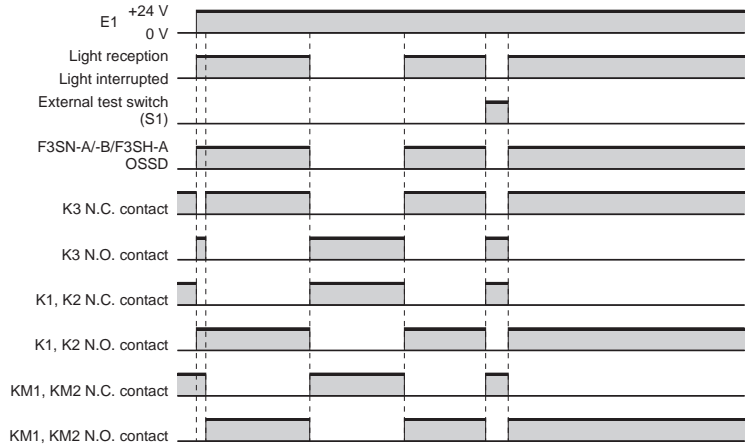
Examples of Safety Circuits Where G9SA-300-SC Safety Relay Unit is Connected

**(1) For only safety light curtain in automatic reset mode
For category 4 rating (F3SN-A, F3SH-A)/category 2 rating (F3SN-B)**



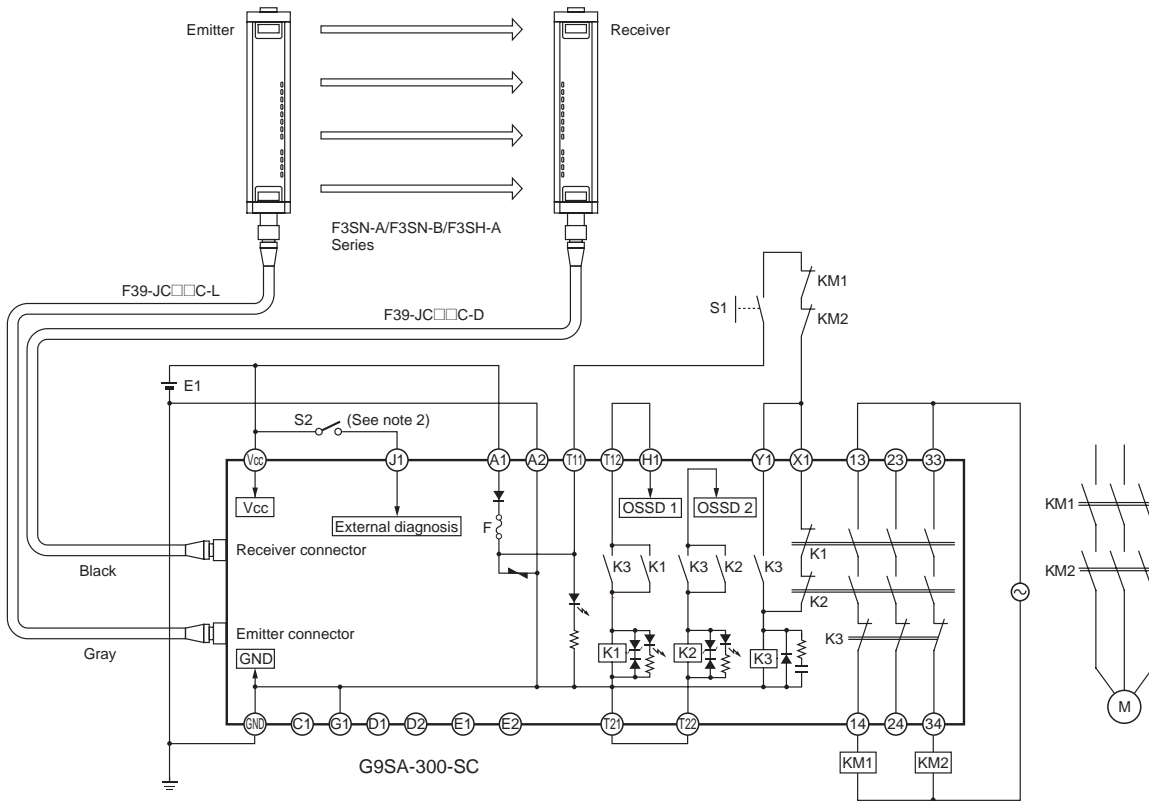
- S1: External test switch
- KM1, KM2: Magnetic contactor (LC1D)
- M: 3-phase motor
- E1: 24 VDC power supply (S82K)

Timing Chart



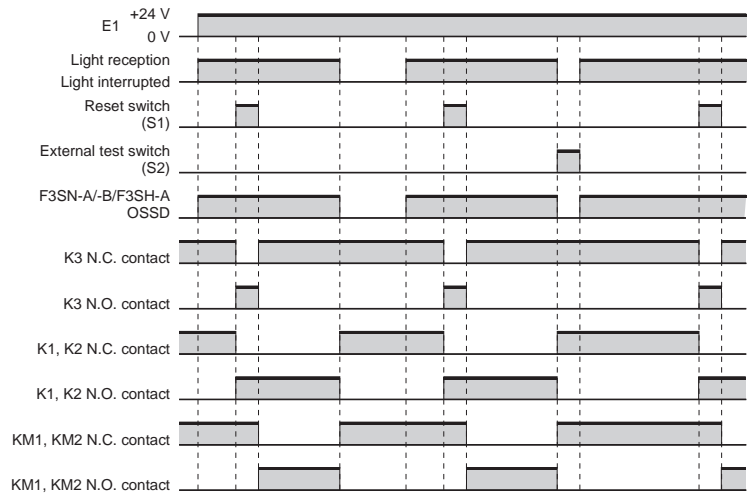
- Note:**
1. F3SN-A's EDM function and auxiliary output cannot be used.
 2. Normal operation is performed when the switch S2 is released, and external diagnosis is performed when it is short-circuited.
 3. Do not connect anything to the C1, D1, D2, E1, and E2 terminals.

(2) For only safety light curtain in manual reset mode
For category 4 rating (F3SN-A, F3SH-A)/category 2 rating (F3SN-B)



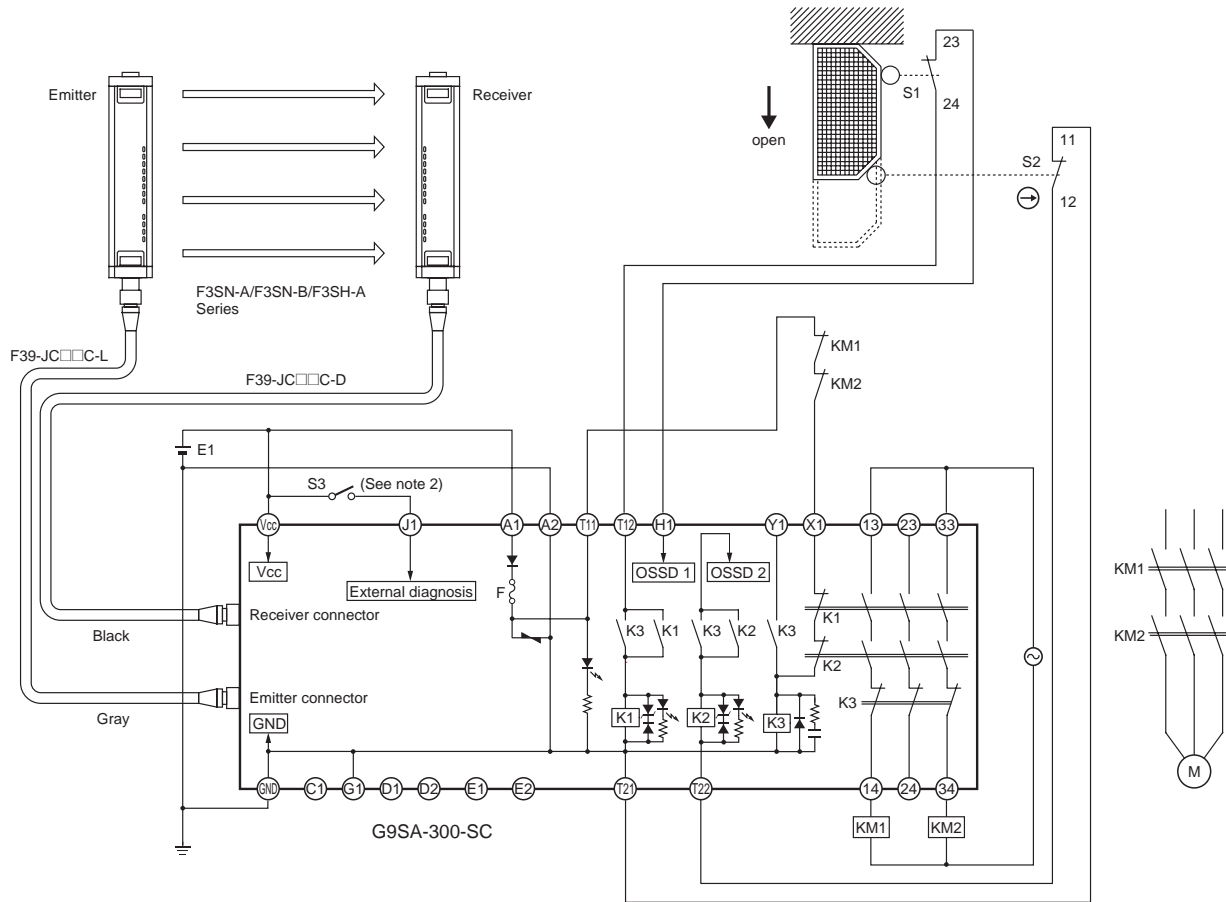
- S1: Reset switch (momentary action switch)
- S2: External test switch
- KM1, KM2: Magnetic contactor (LC1D)
- M: 3-phase motor
- E1: 24 VDC power supply (S82K)

Timing Chart



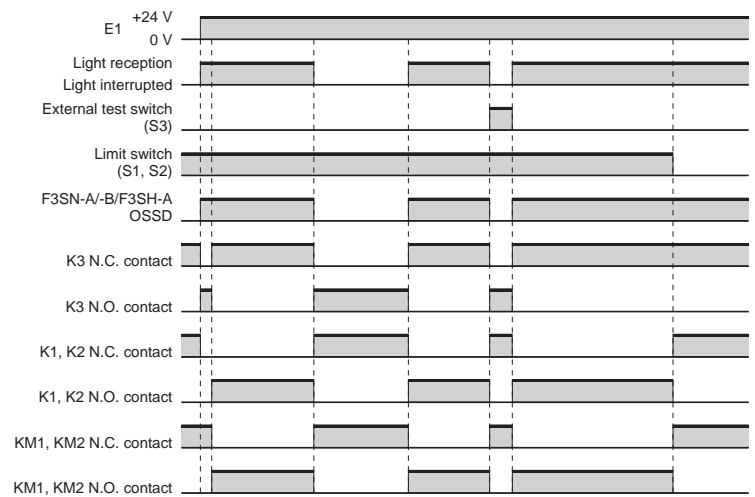
- Note:**
1. F3SN-A's EDM function and auxiliary output cannot be used.
 2. Normal operation is performed when the switch S2 is released, and external diagnosis is performed when it is short-circuited.
 3. Do not connect anything to the C1, D1, D2, E1, and E2 terminals.

(3) Safety light curtain connected with two channel limit switch inputs in automatic reset mode
For category 4 rating (F3SN-A, F3SH-A)/category 2 rating (F3SN-B)



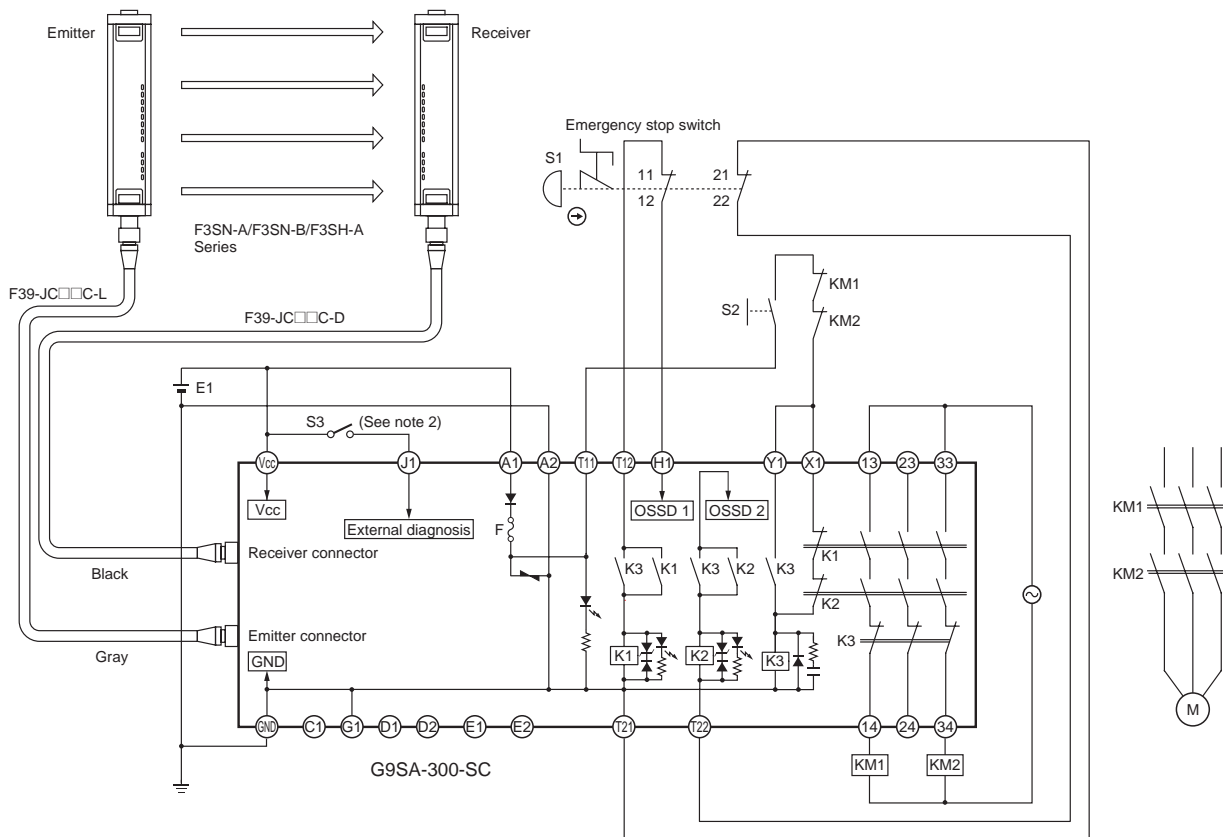
- S1: Limit switch
- S2: Safety limit switch with positive opening mechanism (D4D or D4B) ⊕
- S3: External test switch
- KM1, KM2: Magnetic contactor (LC1D)
- M: 3-phase motor
- E1: 24 VDC power supply (S82K)

Timing Chart



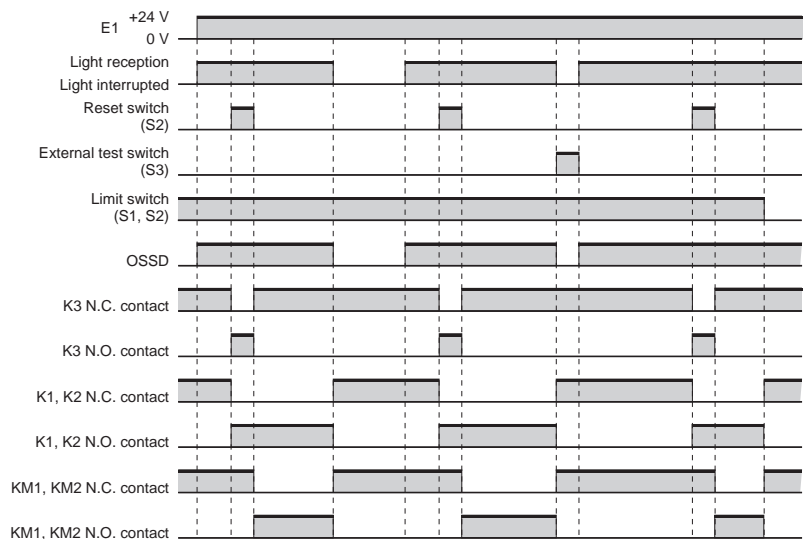
- Note:**
1. F3SN-A's EDM function and auxiliary output cannot be used.
 2. Normal operation is performed when the switch S3 is released, and external diagnosis is performed when it is short-circuited.
 3. Do not connect anything to the C1, D1, D2, E1, and E2 terminals.

(4) Safety light curtain connected with two channel emergency stop switch inputs in manual reset mode
For category 4 rating (F3SN-A, F3SH-A)/category 2 rating (F3SN-B)



- S1: Emergency stop switch
- S2: Reset switch (momentary action switch)
- S3: External test switch
- KM1, KM2: Magnetic contactor (LC1D)
- M: 3-phase motor
- E1: 24 VDC power supply (S82K)

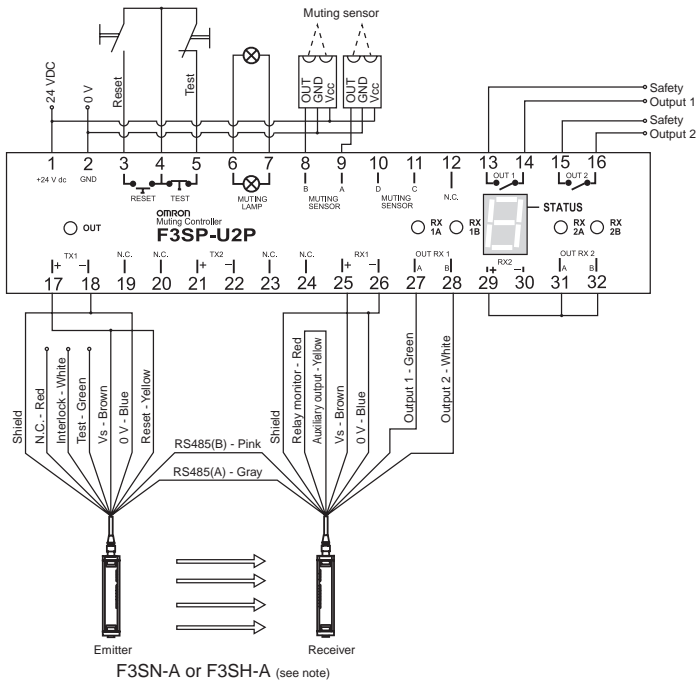
Timing Chart



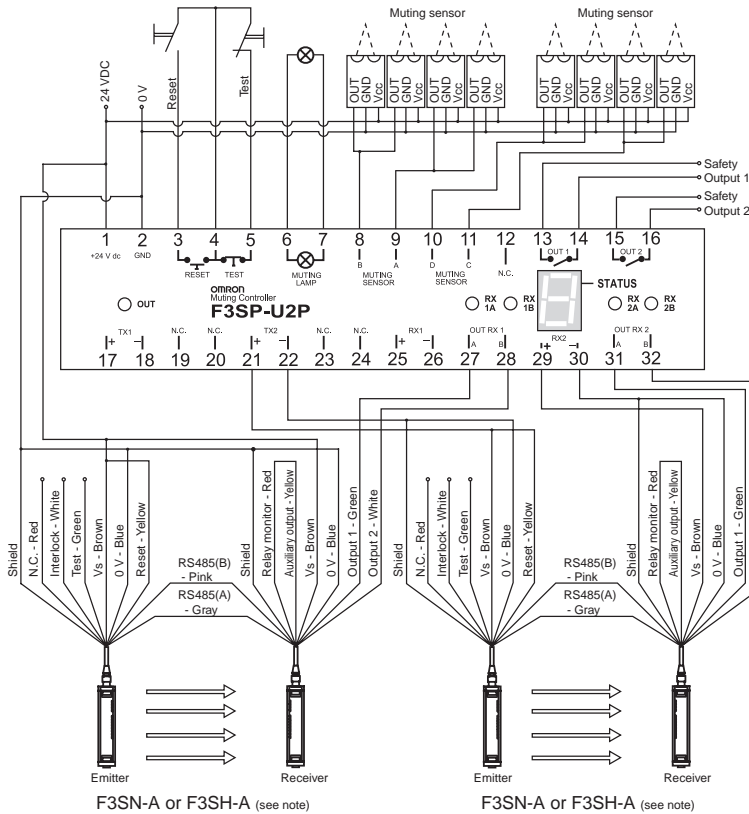
- Note:**
1. F3SN-A's EDM function and auxiliary output cannot be used.
 2. Normal operation is performed when the switch S2 is released, and external diagnosis is performed when it is short-circuited.
 3. Do not connect anything to the C1, D1, D2, E1, and E2 terminals.

Connection with F3SP-U2P Muting Controller For category 4 rating (F3SN-A, F3SH-A)

(1) When one safety light curtain and two muting sensors are used

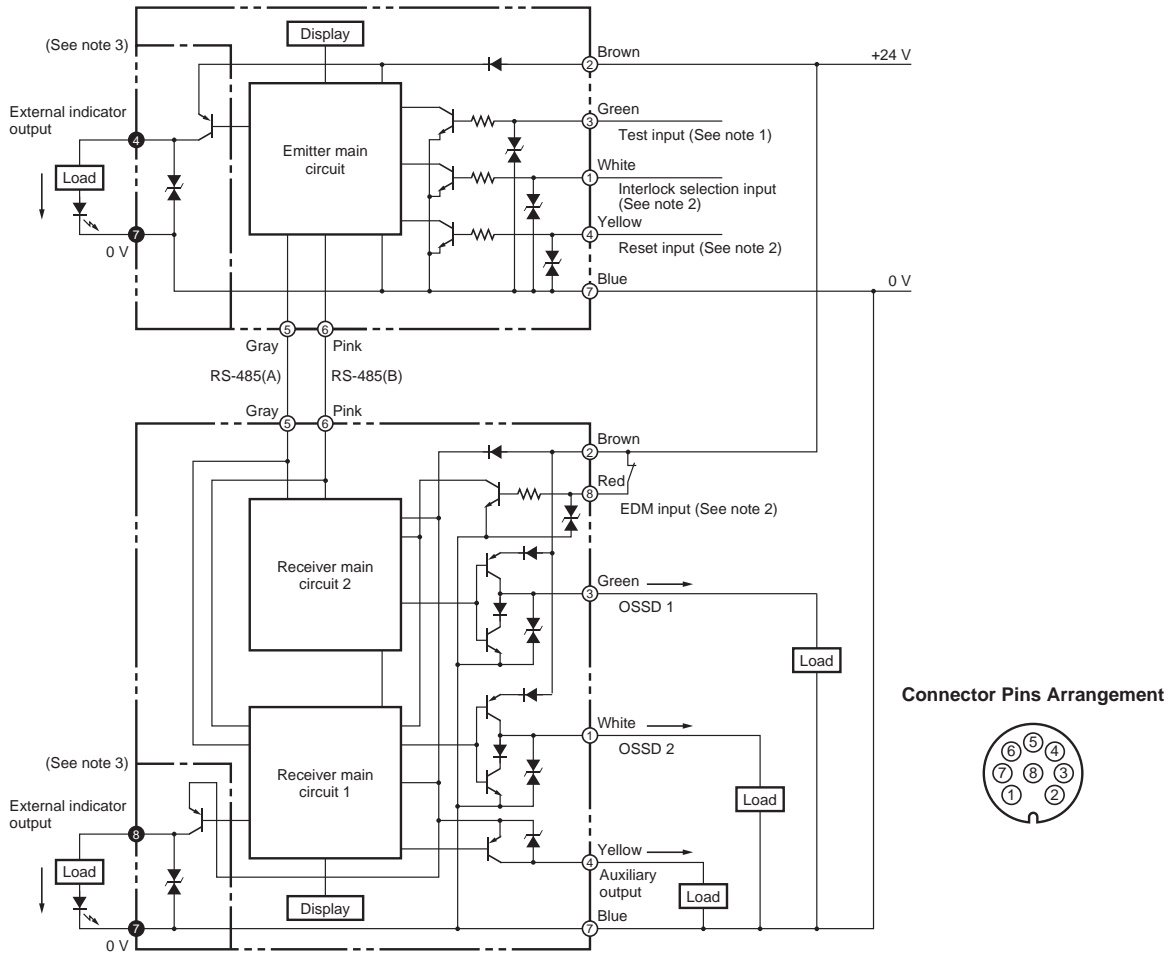


(2) When two safety light curtains and eight muting sensors are used



I/O Circuit

Circuit



- Note:**
1. Open: normal light emission, short to the +24 VDC: stops light emission
 2. Refer to *Wiring Diagram, Wiring for Sensor Only Configuration* on page 15.
 3. The section encircled with the dashed line is applied for models ending in -01 only.
 4. The numbers in ○ indicate pin numbers of the connectors.
The numbers in ● indicate pin numbers of the series connection connectors.

Single-ended Connector Cable

Model	Internal wiring	Pin No.	Wire color	Signal name	
				Receiver	Emitter
F39-JC3A (3 m) F39-JC7A (7 m) F39-JC10A (10 m) F39-JC15A (15 m)		1	White	OSSD 2	Interlock selection input
		2	Brown	+24 V	+24 V
		3	Green	OSSD 1	Test input
		4	Yellow	Auxiliary output	Reset input
		5	Gray	RS-485(A)	RS-485(A)
		6	Pink	RS-485(B)	RS-485(B)
		7	Blue	0 V	0 V
		8	Red	EDM input	N.C.

I/O Circuit

Output waveform of the OSSD outputs

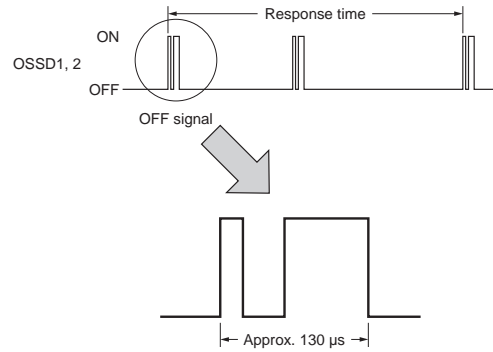
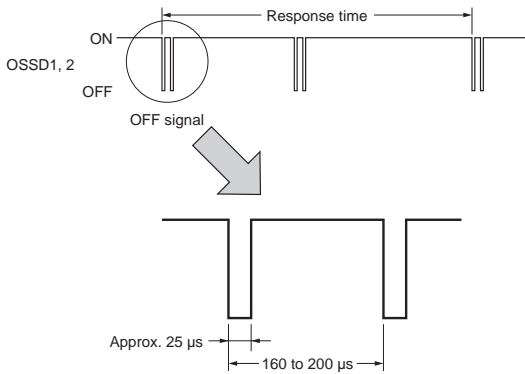
The OSSD outputs will be OFF as shown in the following figure in order to perform the OSSD circuit self-test when the light curtain is in the ON-state.

The OSSD circuit diagnosis is correct when this OFF signal is fed back. If the output signal does not contain an OFF signal, the receiver determines that there is an output circuit or wiring failure and goes into the lockout condition.

The number of OFF signals depends on the number of light curtains connected in series. (See the chart at left.)

In the same way, the OSSD outputs will be ON as shown in the following figure, to perform the OSSD circuit self-test when the light curtain is in the OFF-state. (See the chart below.)

Check the input response time of a machine connected to the F3SN-A carefully to ensure the machine will not malfunction due to the OFF signal.



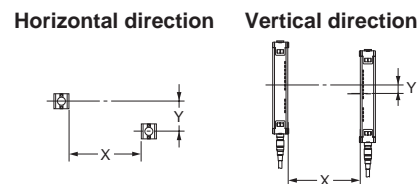
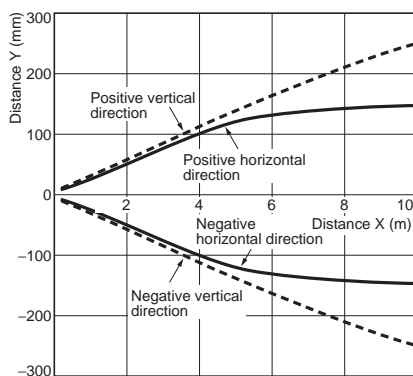
Note: This chart indicates the instance of 2 light curtains series connection.

No. of light curtains connected in series	No. of OFF signals within the response time
No	1
2 light curtains	2
3 light curtains	3

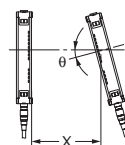
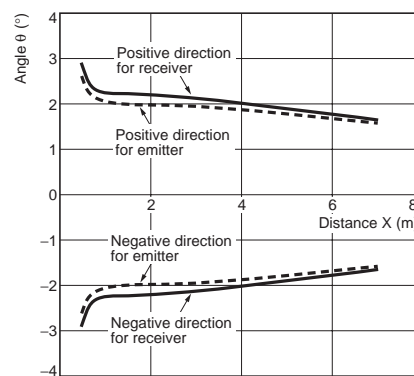
Series connection	No. of ON signals within the response time
No	1
2 light curtains	2
3 light curtains	3

Engineering Data (Typical Examples)

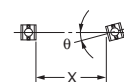
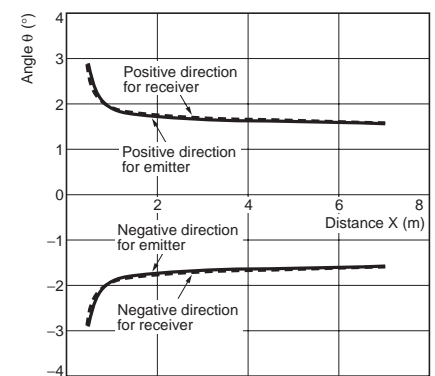
Parallel operating range F3SN-A1107P14



Angular range (Angle of elevation) F3SN-A1107P14



Angular range (Angle of rotation) F3SN-A1107P14



Correct Usage

This catalog is intended as a guide for product selection. Be sure to use the instruction manual provided with the product for actual operation.

Regulations and Standards

F3SN-A/F3SH-A

1. "Type Approval" specified in the Chapter 44. 2 of the Industrial Safety and Health Law in Japan does not apply to independent units of the F3SN-A/F3SH-A sensors. This law applies to systems incorporated with the sensor's.
When using the F3SN-A/F3SH-A sensor in Japan as "safety devices for presses or shearing machines" as specified in the Chapter 42 of the same law, apply for approval as a system.
2. (1) The F3SN-A/F3SH-A is electro-sensitive protective equipment (ESPE) in accordance with European Union (EU) Machinery Directive Annex IV, B, Safety Components, Item 1.
(2) The F3SN-A/F3SH-A complies with the following regulations and standards:
 1. EU Regulations
 - Machinery Directive: Directive 98/37/EC
 - EMC Directive: Directive 89/336/EEC
 2. European standards: EN61496-1 (TYPE 4 ESPE), prEN61496-2 (TYPE 4 AOPD)
 3. International standards: IEC61496-1 (TYPE 4 ESPE), IEC61496-2 (TYPE 4 AOPD)
 4. American standards: UL61496-1 (type 4 ESPE), UL61496-2 (type 4 AOPD), UL508, UL1998, CAN/CSA22.2 No. 14, CAN/CSA22.2 No. 0.8
 5. JIS standards: JIS B9704-1 (type 4 ESPE), JIS B9704-2 (type 4 AOPD)
- (3) The F3SN-A/F3SH-A received the following approvals from the EU accredited body DEMKO A/S:
 - EC Type-Examination in accordance with the EU Machinery Directive (TYPE 4 ESPE)
 - Certificate of a competent body for EMC
 - DEMKO Type Approval
Type 4 ESPE (EN61496-1)
Type 4 AOPD (prEN61496-2)
- (4) The F3SN-A/F3SH-A received the following approvals from the Third Party Assessment Body UL:
 - Certificate of UL listing for US and Canadian safety standards
Both of which are: TYPE 4 ESPE (UL61496-1),
TYPE 4 AOPD (UL61496-2)
- (5) The F3SN-A/F3SH-A received the following approvals from BG-PRUFZERT of Germany:
 - BG test and approval mark
License
Type 4 ESPE (EN61496-1)
Type 4 AOPD (prEN61496-2)
3. The F3SN-A/F3SH-A is designed according to the following standards. To make sure that the F3SN-A/F3SH-A complies with the following standards and regulations, you are asked to design and use it as provided by any other related standards, laws, and regulations. (Underlined regulations are applicable to the F3SN-A only.) Consult UL or other standardization bodies if you have any questions.
 - EN415-4, prEN691, EN692, prEN693 (European standards)
 - OSHA 29 CFR 1910. 212 (US Industrial Safety and Health Regulation)
 - OSHA 29 CFR 1910. 217 (US Industrial Safety and Health Regulation)
 - ANSI B11. 1 - B11. 19 (US standard)
 - ANSI/RIA 15. 06 (US standard)

F3SN-B

1. "Type Approval" specified in the Chapter 44. 2 of the Industrial Safety and Health Law in Japan does not apply to independent units of the F3SN-B sensor. This law applies to systems incorporated with the sensors.
When using the F3SN-B sensor in Japan as a "safety device for presses or shearing machines" as specified in the Chapter 42 of the same law, apply for approval as a system.
2. (1) The F3SN-B is electro-sensitive protective equipment (ESPE) in accordance with European Union (EU) Machinery Directive Annex IV, B, Safety Components, Item 1.
(2) The F3SN-B complies with the following regulations and standards:
 1. EU Regulations
 - Machinery Directive: Directive 98/37/EC
 - EMC Directive: Directive 89/336/EEC
 2. European standards: EN61496-1 (TYPE 2 ESPE), prEN61496-2 (TYPE 2 AOPD)
 3. International standards: IEC61496-1 (TYPE 2 ESPE), IEC61496-2 (TYPE 2 AOPD)
 4. American standards: UL61496-1 (type 2 ESPE), UL61496-2 (type 2 AOPD), UL508, UL1998, CAN/CSA22.2 No. 14, CAN/CSA22.2 No. 0.8
 5. JIS standards: JIS B9704-1 (type 2 ESPE), JIS B9704-2 (type 2 AOPD)
- (3) The F3SN-B received the following approvals from the EU accredited body DEMKO A/S:
 - EC Type-Examination in accordance with the EU Machinery Directive (TYPE 2 ESPE)
 - Certificate of a competent body for EMC
 - DEMKO Type Approval
Type 2 ESPE (EN61496-1)
Type 2 AOPD (prEN61496-2)
Use: EN954-1 Category B, 1, 2
- (4) The F3SN-B received the following approvals from the Third Party Assessment Body UL:
 - Certificate of UL listing for US and Canadian safety standards
Both of which are: Type 2 ESPE (UL61496-1),
Type 2 AOPD (UL61496-2)
- (5) The F3SN-B received the following approvals from BG-PRUFZERT of Germany:
 - BG test and approval mark
License
Type 2 ESPE (EN61496-1)
Type 2 AOPD (prEN61496-2)
3. The F3SN-B is designed according to the following standards. To make sure that the F3SN-B complies with the following standards and regulations, you are asked to design and use it as provided by any other related standards, laws, and regulations. Consult UL or other standardization bodies if you have any questions.
 - EN415-4 (European standard)
 - OSHA 29 CFR 1910. 212 (US Industrial Safety and Health Regulation)
 - ANSI/RIA 15. 06 (US standard)

WARNING

Detection zone and intrusion path

[F3SN-A/F3SN-B Safety Light Curtain]

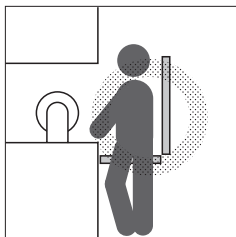
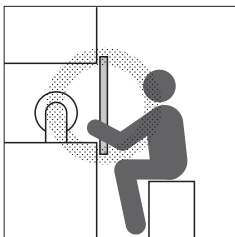
Install protective structures around the machine so that you must pass through the detection zone of the F3SN-A/F3SN-B to reach a hazardous part of the machine.

Install the F3SN-A/F3SN-B so that some part of the operator's body remains in the detection zone at all times when the operator works in a hazardous area. Failure to do so may result in serious injury.

Correct Installation

A hazardous part of a machine can be reached only by passing through the sensor detection zone.

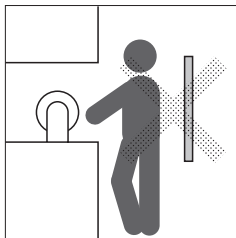
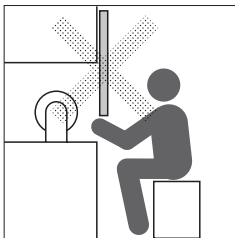
Some part of the operator's body remains in the detection zone while they are working.



Incorrect Installation

A hazardous part of a machine can be reached without passing through the sensor detection zone.

A worker is between the sensor detection zone and a hazardous part of a machine.



[F3SH-A Multi-beam Safety Sensor]

Install protective structures around the machine so that you must pass through the detection zone of the F3SH-A to reach a hazardous part of the machine.

If it is possible for an operator to get between the sensor's detection zone and the hazardous part of the machine, design the system so that machinery cannot start up automatically. Make sure that machinery cannot restart while the operator is in the hazardous area. Position the switch for restarting machinery in a location from which the status of the hazardous area can be seen clearly. The switch position location must be a place where the switch cannot be operated from within the hazardous area.

Failure to do so may result in serious injury.

Use of the fixed blanking function (F3SN-A only)

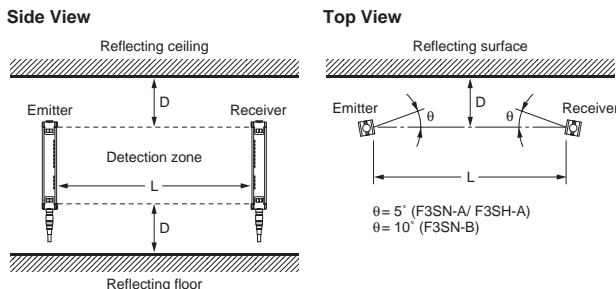
After setting the fixed blanking, check that the F3SN-A detects a test rod at any position in the detection zone through which a person can reach the hazardous part of the machine. If any positions are found by check above, install protective structures to prevent intrusion, which the F3SN-A can not detect.

Failure to do so may result in serious injury.

Distances from reflective surfaces

Be sure to install the F3SN-A/F3SN-B/F3SH-A to minimize the effects of reflection from nearby surfaces.

Failure to do so may cause detection to fail and may result in serious injury.



Install the F3SN-A/F3SN-B/F3SH-A with minimum Distance D shown above from reflective surfaces (highly reflective surfaces) such as metal walls, floors, ceilings, and work pieces.

Distance between emitter and receiver (Operating range L)	Minimum installation distance D	
	F3SN-A/ F3SH-A	F3SN-B
0.2 to 3 m	0.13 m	0.26 m
over 3 m	$L/2 \times \tan 5^\circ = L \times 0.044$ (m)	$L/2 \times \tan 10^\circ = L \times 0.088$ (m)

Safety distance

Always maintain a safe distance (S) between the light curtain and a hazardous part of a machine.

Failure to do so causes the machine to fail to stop before an operator reaches the dangerous area and may result in serious injury.

Use of the floating blanking increases the size of the detection capability. To calculate a safety distance, be sure to use the increased size of the detection capability.

Failure to do so causes the machine to fail to stop before an operator reaches the dangerous area and may result in serious injury.

The "safety distance" is the minimum distance that must be maintained between the F3SN-A/F3SN-B/F3SH-A and a hazardous part of a machine in order to stop the machine before someone or something reaches it. The safety distance is calculated based on the following equation when a person moves perpendicular to the detection zone of a light curtain.

$$\text{Safety distance (S)} = \text{Intrusion speed into the detection zone (K)} \times \text{Total response time for the machine and light curtain (T)} + \text{Additional distance calculated based on the detection capability of the light curtain (C)} \dots\dots\dots (1)$$

The safety distance varies with national standards and individual machine standards. The equation is also different if the direction of intrusion is not perpendicular to the detection zone of the light curtain. Be sure to refer to related standards.

[F3SN-A/F3SN-B Safety Light Curtain]

<Reference>

Method for calculating safety distance as provided by European Norm EN999 (for intrusion perpendicular to the detection zone)

Detection capability: 40mm or less

Substitute $K = 2000 \text{ mm/s}$ and $C = 8 (d - 14 \text{ mm})$ in equation (1) and calculate as shown below.

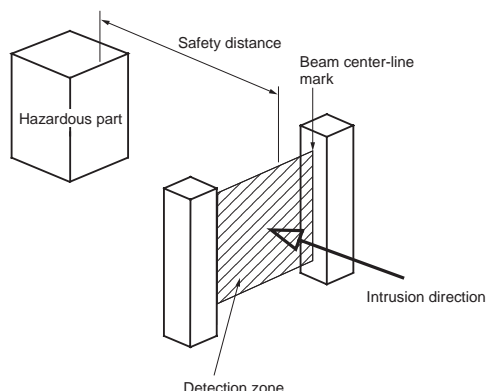
$$S = 2000 \text{ mm/s} \times (T_m + T_s) + 8 (d - 14 \text{ mm}) \dots \dots \dots (2)$$

Where: S = Safety distance (mm)

T_m = Machine response time (s) (See note 1)

T_s = Light curtain response time (s) (See note 2)

d = Detection capability of the light curtain (mm)



e. g.:

$$T_m = 0.05 \text{ s}, T_s = 0.01 \text{ s}, d = 14 \text{ mm}:$$

$$S = 2,000 \text{ mm/s} \times (0.05 \text{ s} + 0.01 \text{ s}) + 8 (14 \text{ mm} - 14 \text{ mm}) = 120 \text{ mm}$$

Use $S = 100 \text{ mm}$ if the result of equation (2) is less than 100 mm. Recalculate using the following equation with $K = 1600 \text{ mm/s}$ if the result is over 500 mm.

$$S = 1600 \text{ mm/s} \times (T_m + T_s) + 8 (d - 14 \text{ mm}) \dots \dots \dots (3)$$

Use $S = 500 \text{ mm}$ if the result from equation (3) is less than 500 mm.

Detection capability: over 40mm

Substitute $K = 1600 \text{ mm/s}$ and $C = 850 \text{ mm}$ in equation (1) and calculate as shown below.

$$S = 1600 \text{ mm/s} \times (T_m + T_s) + 850$$

Where: S = Safety distance (mm)

T_m = Machine response time (s) (See note 1)

T_s = Light curtain response time (s) (See note 2)

e. g.:

$$T_m = 0.05 \text{ s}, T_s = 0.01 \text{ s}:$$

$$S = 1600 \text{ mm/s} \times (0.05 \text{ s} + 0.01 \text{ s}) + 850 \text{ mm} = 946 \text{ mm}$$

Note: 1. The machine response time refers to the maximum time from the moment the machine receives a stop signal to the moment the hazardous part of the machine stops. The machine response time should be measured on actual machines. The machine response time should be measured and confirmed periodically.

Response Time Table

Model	Protective height (mm)	Number of beams	Response time	
			ON to OFF	OFF to ON
F3SN-A□□□□ P14(-01)	180 to 450	20 to 50	10.0	40
	459 to 765	51 to 85	12.5	50
	774 to 1080	86 to 120	15.0	60
	1089 to 1125	121 to 125	15.5	62

Model	Protective height (mm)	Number of beams	Response time	
			ON to OFF	OFF to ON
F3SN-A□□□□ P25(-01)	217 to 772	13 to 50	10.0	40
	787 to 1297	51 to 85	12.5	50
F3SN-B□□□□ P25	1312 to 1822	86 to 120	15.0	60

Model	Protective height (mm)	Number of beams	Response time	
			ON to OFF	OFF to ON
F3SN-A□□□□ P40(-01)	217 to 757	7 to 25	10.0	40
	787 to 1297	26 to 43	12.5	50
F3SN-B□□□□ P40	1327 to 1807	44 to 60	15.0	60

Model	Protective height (mm)	Number of beams	Response time	
			ON to OFF	OFF to ON
F3SN-A□□□□ P70(-01)	277 to 757	5 to 13	10.0	40
	817 to 1297	14 to 22	12.5	50
F3SN-B□□□□ P70	1357 to 1777	23 to 30	15.0	60

• Response time for series connected types is calculated as follows: (F3SN-A)

For 2 sets:

Response time (ON to OFF): Response time of Light curtain 1 + Response time of Light curtain 2 + 3 ms

Response time (ON to OFF): Response time of Light curtain 1 + Response time of Light curtain 2 + 12 ms

For 3 sets:

Response time (ON to OFF): Response time of Light curtain 1 + Response time of Light curtain 2 + Response time of Light curtain 3 + 4 ms

Response time (ON to OFF): Response time of Light curtain 1 + Response time of Light curtain 2 + Response time of Light curtain 3 + 16 ms

• Response time of F3SP-B1P is 10 ms, operation time is 100 ms.

2. The light curtain response time refers to the time required for output to change from ON to OFF.

3. When using the F3SP-B1P, determine the safety distance by adding the response time of the F3SP-B1P to that of the F3SN given in the table above.

<Reference>

Method for calculating the safety distance as provided by ANSI B11. 19 (US)

Safety distance (S) = Intrusion speed into the detection zone (K)

Response time (Ts + Tc + Tr + Tbm) + Additional distance (Dpf)

Where:

K = Intrusion speed (Recommended value in OSHA standards is 1600 mm/s)

ANSI B11. 19. does not define Intrusion speed (K). When determining K, consider possible factors including physical ability of operators.

Ts = Time required for machine to stop (s)

Tr = Light curtain response time (s) (See note)

Tc = Maximum response time required for machine control circuit to apply brake (s)

Tbm = Additional time (s)

If the machine is provided with a brake monitor, Tbm = brake monitor setting time – (Ts + Tc). If not provided with a brake monitor, it is recommended to determine a value more than 20% of (Ts + Tc) as the additional time.

Dpf = Additional distance. Dpf is calculated as follows based on ANSI standards.

$Dpf = 3.4 \times (d - 7.0)$

: d is the detection capability of the light curtain (mm).

e. g.:

Assume that: K = 1600 mm/s, Ts + Tc = 0.06 s, Brake monitor setting time = 0.1s, Tr = 0.01s, d = 14 mm.

Then:

$Tbm = 0.1 - 0.06 = 0.04 \text{ s}$

$Dpf = 3.4 - (14 - 7.0) = 23.8 \text{ mm}$

$S = 1600 \times (0.06 + 0.01 + 0.04) + 23.8 = 199.8 \text{ mm}$

Note: The light curtain response time refers to the time required for output to change from ON to OFF.

<Reference>

Method for calculating the safety distance as provided by ANSI/RIA R15.06 (US) (for intrusion perpendicular to the detection zone)

Safety distance (Ds) = K × (Ts + Tc + Tr) + Dpf

Where:

K = Intrusion speed: 1600 mm/s min.

Ts = Maximum stop time of machine/equipment (s)

Tc = Maximum stop time of control system (s)

Tr = Light curtain response time (s)

Os = Diameter of the smallest detectable object (mm)

Dpf = Additional distance (mm)

Assume that the sensor is installed with the lowest beam height above the floor at 300 mm and the highest beam height above the floor at 1200 mm, with the diameter of the smallest detectable object being 64 mm or less. Then, Dpf is determined from:

$Dpf = 3.4 \times (Os - 6.875 \text{ mm})$.

If the diameter of the smallest detectable object is more than 64 mm, Dpf is calculated to be 900 mm.

e. g.:

• F3SN-B□□□□P40 Safety Light Curtain

Assume that K = 1600 mm/s, Ts + Tc = 0.06 s, Tr = 0.01 s, and Os = 40 mm.

Then:

$S = 1,600 \times (0.06 + 0.01) + Dpf$

$= 1,600 \times (0.06 + 0.01) + 3.4 (40 - 6.875)$

$= 225 \text{ mm}$

• F3SN-B□□□□P70 Safety Light Curtain

Assume that K = 1600 mm/s, Ts + Tc = 0.06 s, Tr = 0.01 s, and Dpf = 900 mm.

Then:

$S = 1600 \times (0.06 + 0.01) + 900$

$= 1012 \text{ mm}$

Note: The light curtain response time refers to the time required for output to change from ON to OFF.

[F3SH-A Multi-beam Safety Sensor]

<Reference>

Method for calculating safety distance as provided by European Norm EN999 (for intrusion perpendicular to the detection zone)

Substitute K = 1600 mm/s and C = 850 mm in equation (1) and calculate as shown below.

$S = 1600 \text{ mm/s} \times (Tm + Ts) + 850$

Where:

S = Safety distance (mm)

Tm = Machine response time (s) (See note 1)

Ts = Sensor response time (s) (See note 2)

e. g.:

Tm = 0.05 s, Ts = 0.01 s:

$S = 1600 \text{ mm/s} \times (0.05 \text{ s} + 0.01 \text{ s}) + 850 \text{ mm} = 946 \text{ mm}$

- Note:**
- The machine response time refers to the maximum time from the moment the machine receives a stop signal to the moment the hazardous part of the machine stops. The machine response time should be measured on actual machines. The machine response time should be measured and confirmed periodically.
 - The sensor response time refers to the time required for output to change from ON to OFF.

Installation

How to prevent mutual interference

The emitter and the receiver to be set facing each other should be a pair of the same set. Erroneous combination may create a zone where objects cannot be detected.

Do not use the sensors for a system where the beam is reflected, or object detection may be disabled. In such an application, use a beam path diversion mirror to prevent the beam reflected from an object from entering the receiver.

When installing two or more pairs of the F3SN-A/F3SN-B/F3SH-A, take necessary measures to prevent mutual interference. Examples of such measures include electrical interconnection and the use of baffle plates.

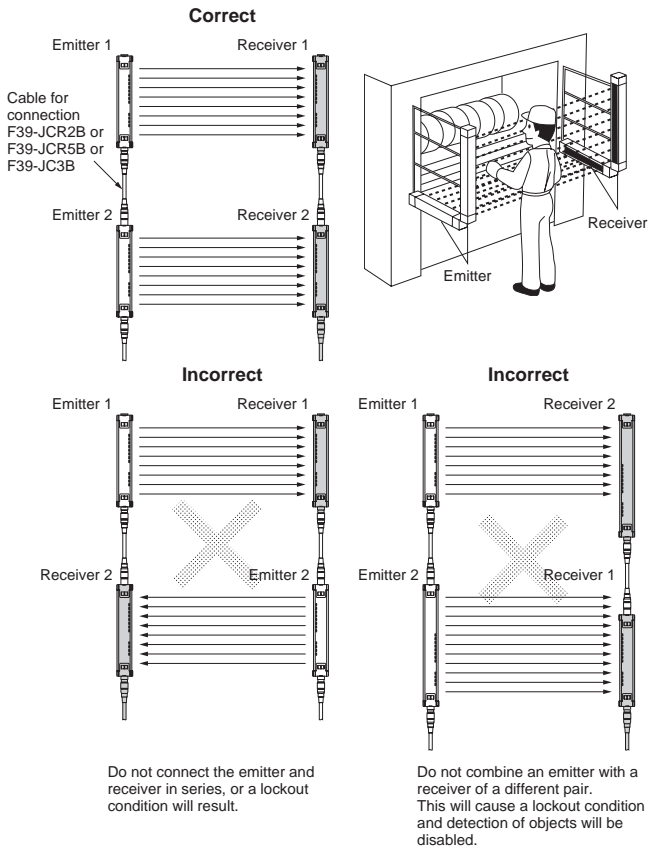
■ Correct Use

Installation

How to prevent mutual interference

Series connection (Up to 3 sets, 240 beams, sensor models ending in -01, -03, -04, and -05 are required for series connection)

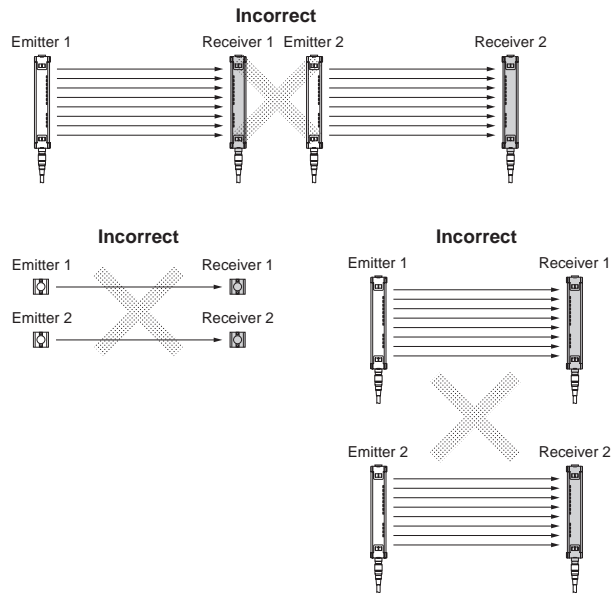
Two or more pairs of the F3SN-A can be connected in series. When connected in series, the F3SN-A sensors generate beams in a time-sharing manner. Thus, they prevent mutual interference and ensure safety.



When not connected

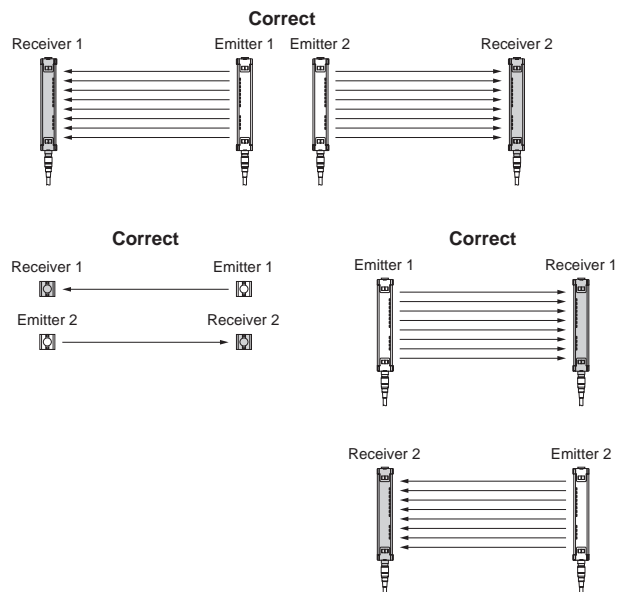
When installing two or more pairs of light curtains independently from each other due to inconvenience of wiring or other reason, take proper measures to prevent mutual interference. If mutual interference occurs, a lockout condition will result for the F3SN-A/F3SN-B/F3SH-A.

• Installation which may cause mutual interference

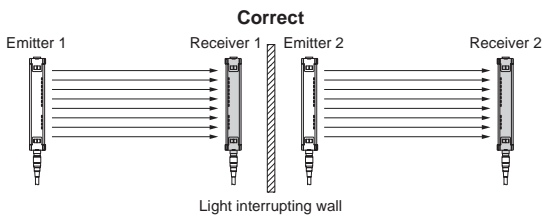


• Installation to prevent mutual interference

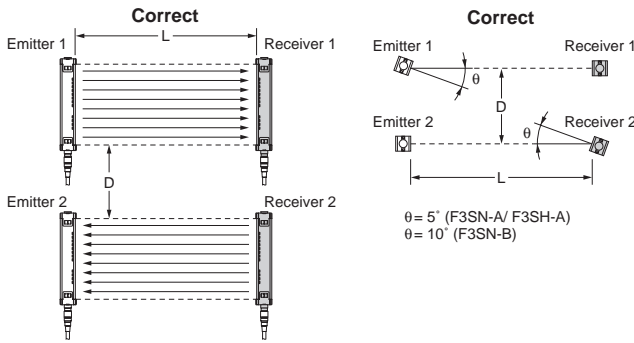
- (1) Install so that the two light curtains emit in the opposite directions (staggered).



(2) Install a light interrupting wall in between sensors.



(3) Install the light curtains facing away from the one another to eliminate mutual interference.



Distance between emitter and receiver (Operating range L)	Minimum installation distance D	
	F3SN-A/ F3SH-A	F3SN-B
0.2 to 3 m	0.26 m	0.52 m
over 3 m	$L \times \tan 5^\circ = L \times 0.088 \text{ (m)}$	$L \times \tan 10^\circ = L \times 0.18 \text{ (m)}$

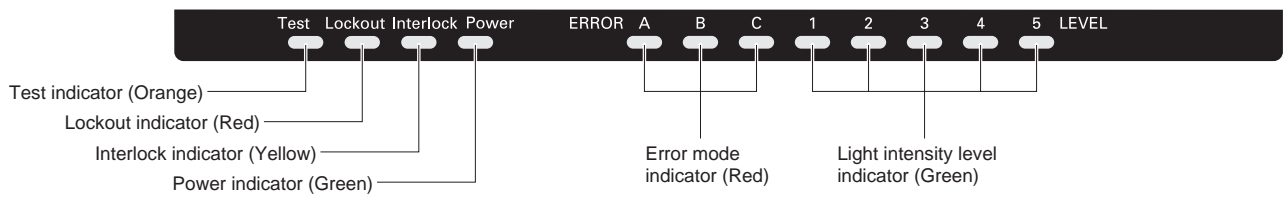
(4) Use a F39-HS spatter protection slit cover.

Operating range

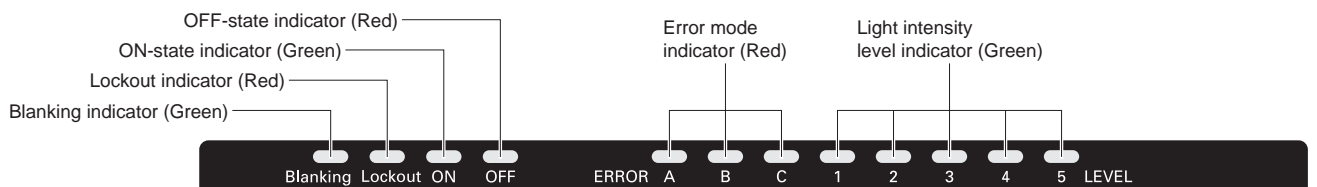
If the distance between the emitter and the receiver is less than 0.2 m, there is a possibility of chattering. Be sure to use the sensors within the rated operating range.

Names and Functions of Parts

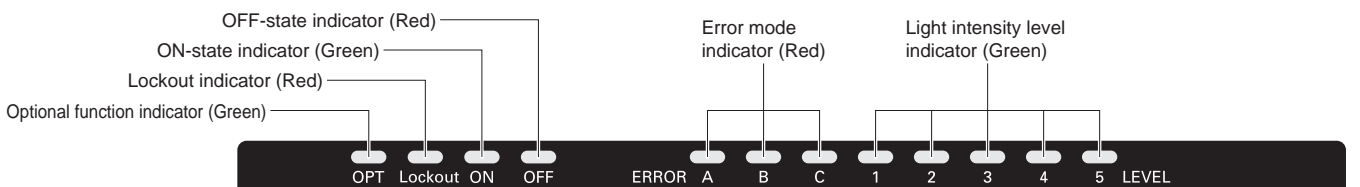
Emitter (F3SN-A/ F3SN-B/ F3SH-A)



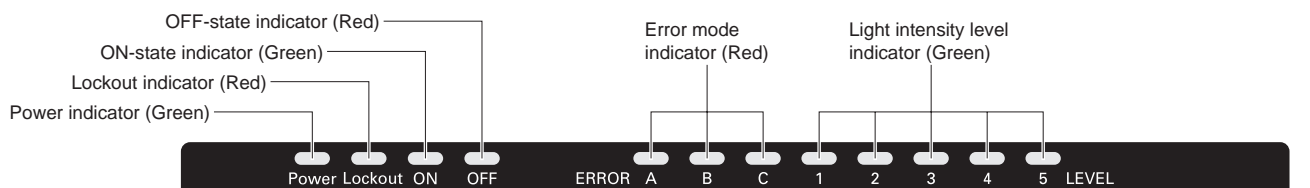
Receiver (F3SN-A)



Receiver (F3SN-B)



Receiver (F3SH-A)



Function

Power indicator	Lit when power is supplied (always lit)..... F3SN-A, F3SH-A Emitter Lit when power is supplied, flashing when the F39-MC11 is connected..... F3SH-A Receiver (see note)
Interlock indicator	Lit during interlock condition
Lockout indicator	Flashing during lockout condition
Test indicator	Lit during external test (see note)
ON-state indicator	Lit when OSSD outputs are in ON-state
OFF-state indicator	Lit when OSSD outputs are in OFF-state
Blanking indicator (F3SN-A only)	Lit when blanking is set, flashing when the F39-MC11 is connected (see note)
Optional function indicator (F3SN-B only)	Flashing after a lapse of 30000 hours

Note: As a preventive maintenance feature, these indicators will flash after a lapse of 30000 hours.

	1	2	3	4	5	Light intensity level
Light intensity level indicator Lit Not lit						200% and above of ON threshold level
						150 to 200% of ON threshold level
						100 to 150% of ON threshold level
						75 to 100% of ON threshold level
						50 to 75% of ON threshold level
						Less than 50% of ON threshold level

	A	B	C	Cause of error
Error mode indicator Flashing Not lit				The Interlock selection input line or the reset input line is not wired correctly or became open.
				Relay contact is welded. Releasing time of the relay takes too long. The EDM input line is not wired correctly or became open.
				Communication line (RS-485) is not wired correctly, became open, or causes other errors.
				One of the OSSD outputs is shorted or is not wired correctly. Other failure in OSSD outputs.
				Mutual interference. Interference light is received.
				Types of the receiver and emitter are not the same. Numbers of the receiver and emitter connected in series are not the same.
				External noise. Internal hardware failure of the receiver or the emitter.

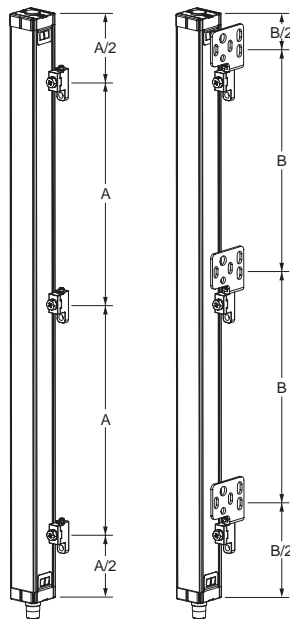
Installation

How to attach mounting bracket (F39-L19/L20)

To fully utilize the performance of sensors, locate the F39-L19/L20 mounting brackets in the number satisfying the dimensions "A" and "B" in the sensor longitudinal direction.

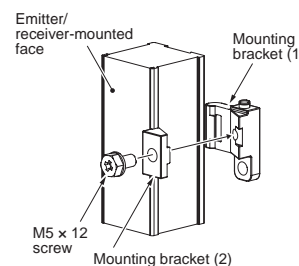
- For the F39-L19
Spacing "A": 670 mm max.
- For the F39-L20
Spacing "B": 400 mm max.

Note: When installing sensors at locations susceptible to vibration and shock, increase the number of mounting brackets.



Mounting bracket	Screw x length (mm)	Tightening torque
F39-L19	M5 x 12 screw	2.0 N·m
F39-L20	M4 x 8 screw	1.2 N·m

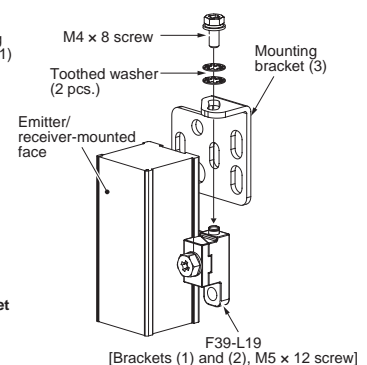
F39-L19



Brackets and screws included in one set

- Mounting bracket (1)1
- Mounting bracket (2)1
- M5 x 12 screw1

F39-L20



Brackets and screws included in one set

- Mounting bracket (1)1
- Mounting bracket (2)1
- M5 x 12 screw1
- Mounting bracket (3)1
- M4 x 8 screw1
- Toothed washer2

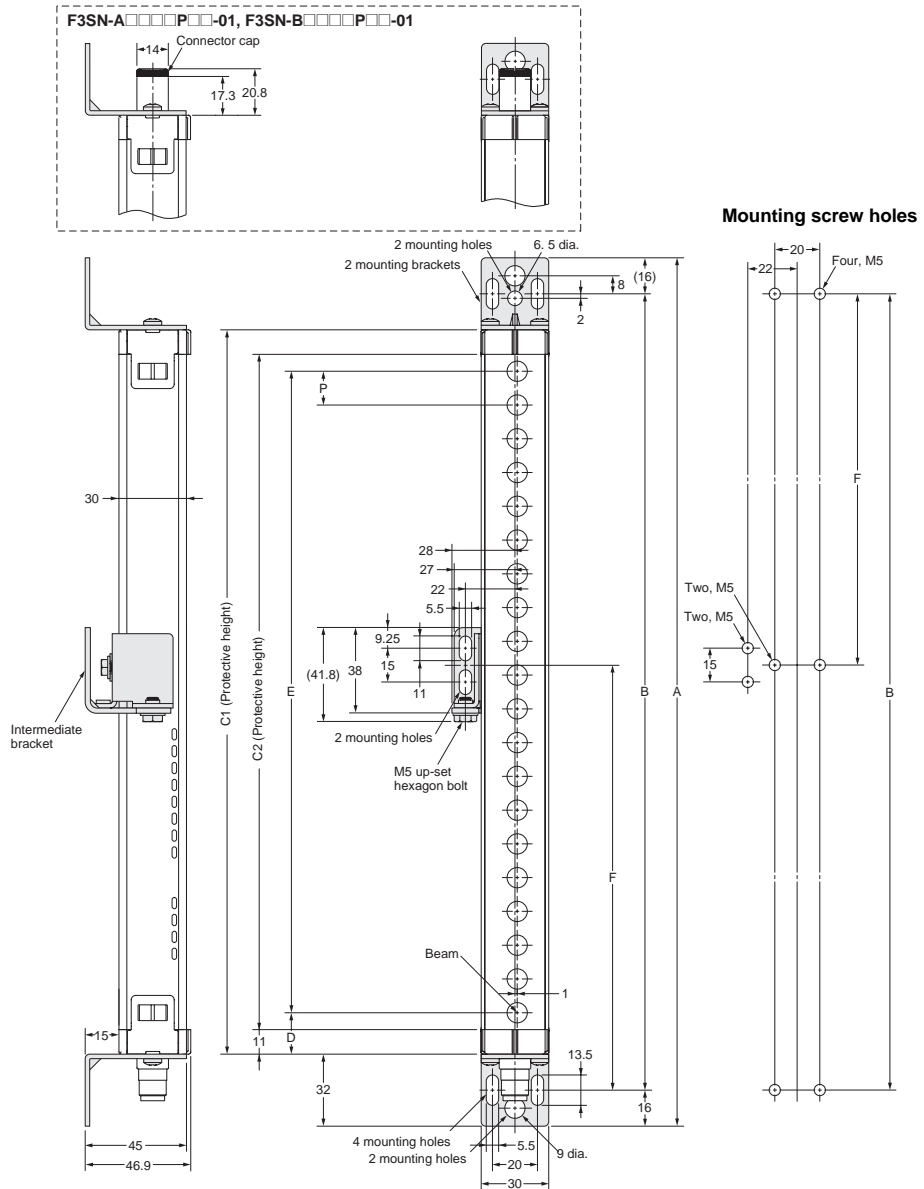
Dimensions

(For other connector configurations, please refer to the Instruction Manual (Cat. No. SCEE-713))

(Unit: mm)

Main unit

F3SN-A□□□□P□□(-01)
F3SN-B□□□□P□□(-01)



Dimensions according to the model can be calculated by using the following equations.

• F3SN-A□□□□P14(-01)

- Dimension C2 (protective height): 4 digits in the model name
- Dimension A = C2 + 86
- Dimension B = C2 + 54
- Dimension D = 15.5
- Dimension E = C2 - 9
- Dimension F: See the table below.
- Dimension P = 9

C2 (protective height)	Number of intermediate mounting bracket	Dimension F (see note)
to 0620	0	—
0621 to 1125	1	F = B/2

Note: If value F obtained from the above equation is not used, set F to 670 mm or less.

• F3SN-A□□□□P25(-01), P40(-01), P70(-01),
F3SN-B□□□□P25(-01), P40(-01), P70(-01)

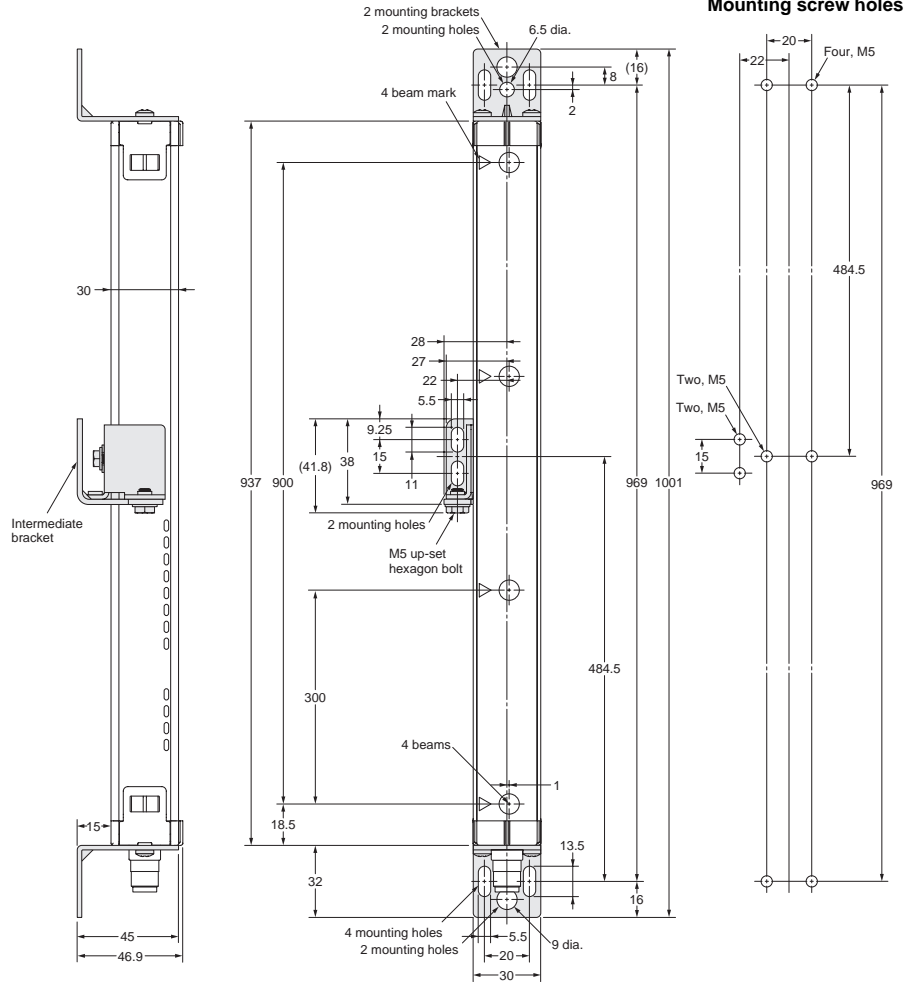
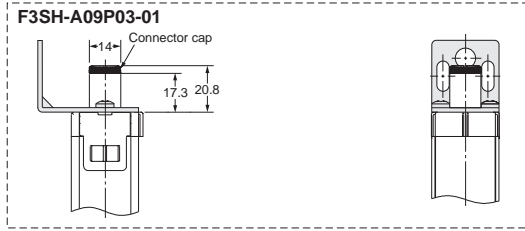
- Dimension C1 (protective height): 4 digits in the model name
- Dimension A = C1 + 64
- Dimension B = C1 + 32
- Dimension D = 18.5
- Dimension E = C1 - 37
- Dimension F: See the table below.

C1 (protective height)	Number of intermediate mounting bracket	Dimension F (see note)
to 0640	0	—
0641 to 1280	1	F = B/2
1281 to 1822	2	F = B/3

Dimension P: See the table below.

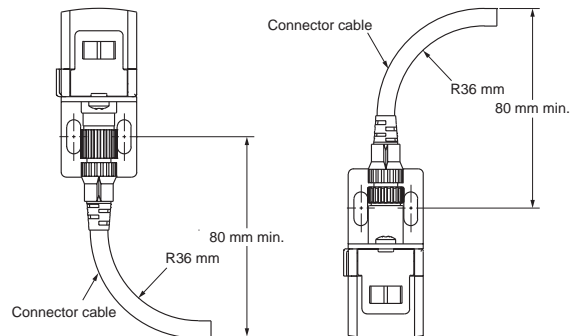
Detection capability	Dimension P
25	15
40	30
70	60

F3SH-A09P03
F3SH-A09P03-01



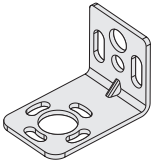
Mounting Precautions

- Note:**
1. The mounting bracket (3) (see Mounting brackets (intermediate)) is shown on the left-hand side of the sensor as an example. If the mounting bracket (3) is on the right-hand side of the sensor then the mounting holes must also be on the right-hand side.
 2. When using with the cable bent, allow at least the dimensions shown on the right. (Minimum bending radius of cable: R36 mm.)



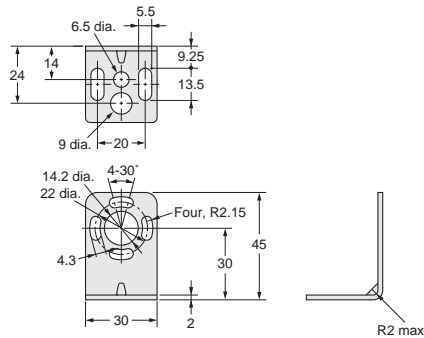
■ Accessories

Mounting bracket (top and bottom)

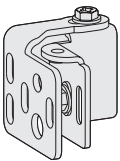


Material: Iron (zinc plating)

Note: Provided with the product.

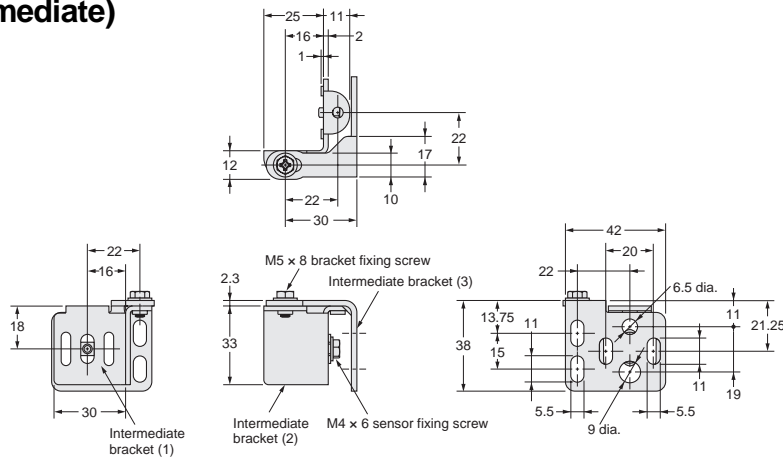


Mounting brackets (intermediate)



Material: Iron (zinc plating)

Note: Provided with the product.
The number of brackets required depends on the total length of the Sensor.



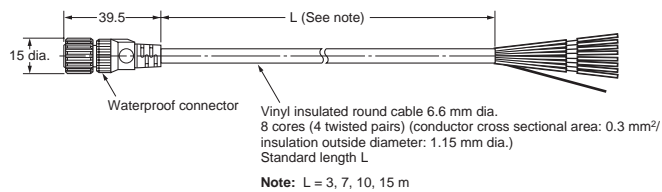
■ Accessories (Optional)

Single-ended connector cable

- F39-JC3A (L = 3 m)
- F39-JC7A (L = 7 m)
- F39-JC10A (L = 10 m)
- F39-JC15A (L = 15 m)



Color: Emitter (gray)
Receiver (black)

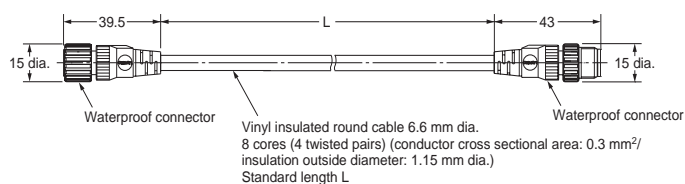


Double-ended connector cable

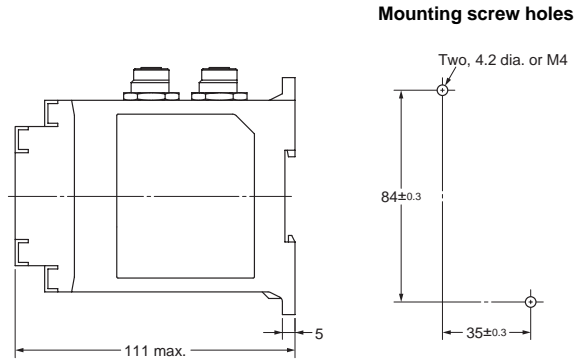
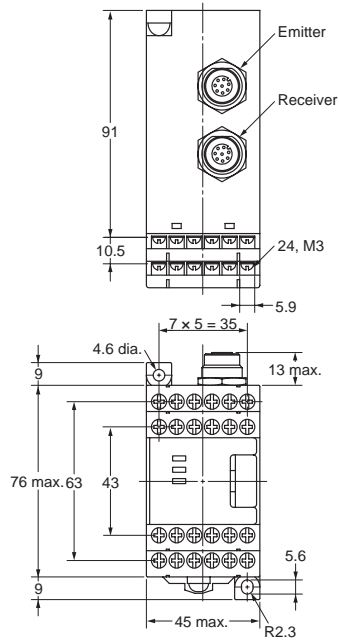
- F39-JCR2B (L = 0.2 m)
- F39-JCR5B (L = 0.5 m)
- F39-JC3B (L = 3 m)
- F39-JC5B (L = 5 m)
- F39-JC7B (L = 7 m)
- F39-JC10B (L = 10 m)
- F39-JC15B (L = 15 m)
- F39-JC20B (L = 20 m)
- F39-JCR2C (L = 0.2 m)
- F39-JC1C (L = 1 m)
- F39-JC3C (L = 3 m)
- F39-JC7C (L = 7 m)
- F39-JC10C (L = 10 m)
- F39-JC15C (L = 15 m)



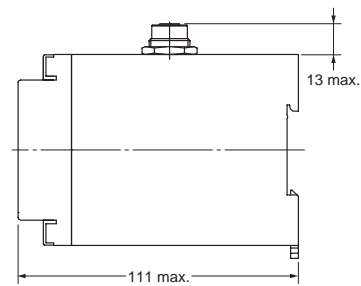
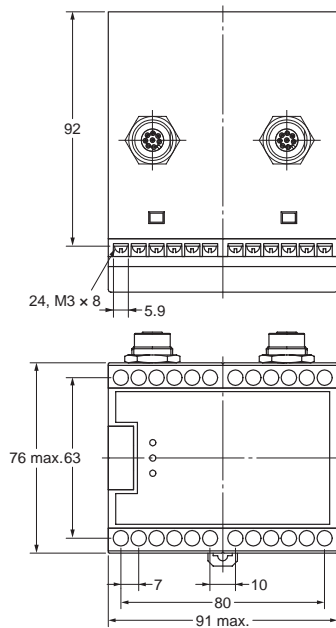
Color: Emitter (gray)
Receiver (black)



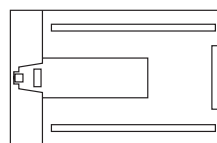
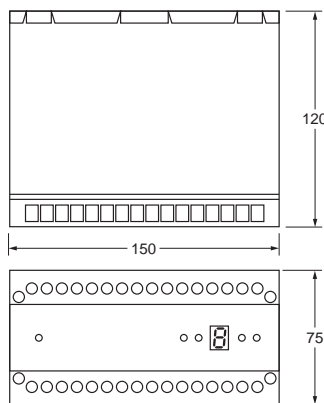
**Control unit
F3SP-B1P**



**Safety relay unit
G9SA-300-SC**

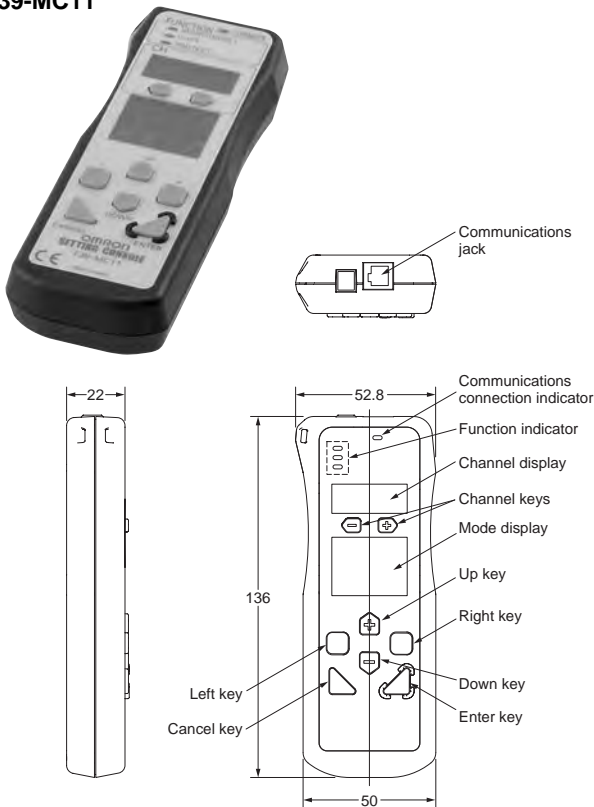


**Muting controller
F3SP-U2P**



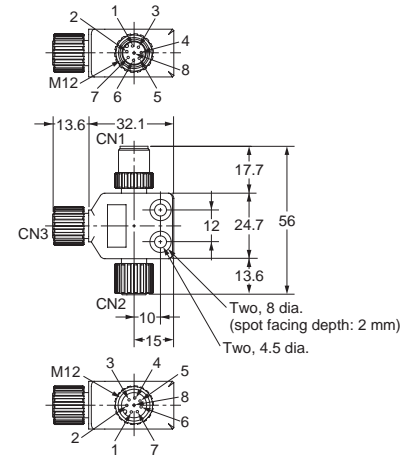
Setting console

F39-MC11



Branching connector (supplied with F39-MC11)

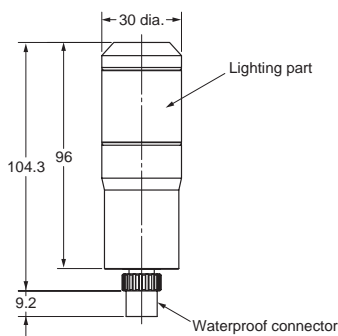
F39-CN1



CN1	Connector cable
CN2	Sensor
CN3	Setting console

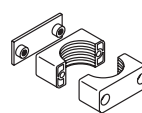
External indicator

F39-A01PR-L/D
F39-A01PG-L/D

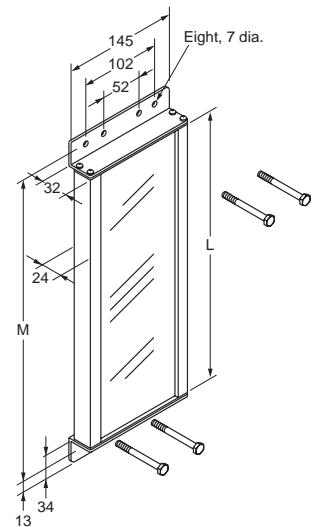
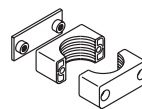


Mirror

F39-MLG□



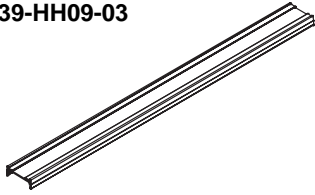
Can be fitted to the F39-ST1 cylindrical mounting rod (42 dia. ±1) (accessory)



Model	L (mm)	M (mm)
F39-MLG0406	445	487
F39-MLG0610	648	690
F39-MLG0711	749	792
F39-MLG0914	953	995
F39-MLG1067	1105	1148
F39-MLG1219	1257	1300
F39-MLG1422	1461	1503
F39-MLG1626	1664	1706
F39-MLG1830	1867	1910
F39-MLG2134	2172	2214

Spatter protection cover

- F39-HN□□□□-14
- F39-HN□□□□-25
- F39-HH09-03



Protection cover



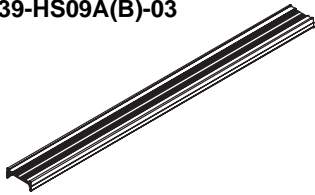
Note: L is as follows.

F39-HN□□□□-14	L = □□□□ mm
F39-HS□□□□A(B)-14	L = □□□□ – 22 mm
F39-HN□□□□-25	L = □□□□ – 22 mm
F39-HS□□□□A(B)-25	L = □□□□ – 22 mm
F39-HH09-03	L = 915 mm
F39-HS09A(B)-03	L = 915 mm

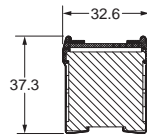
Materials: PC (transparent area)
ABS (non-transparent area)

Spatter protection slit cover

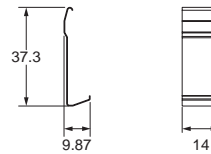
- F39-HS□□□□A(B)-14
- F39-HS□□□□A(B)-25
- F39-HS09A(B)-03



Mounting dimensions



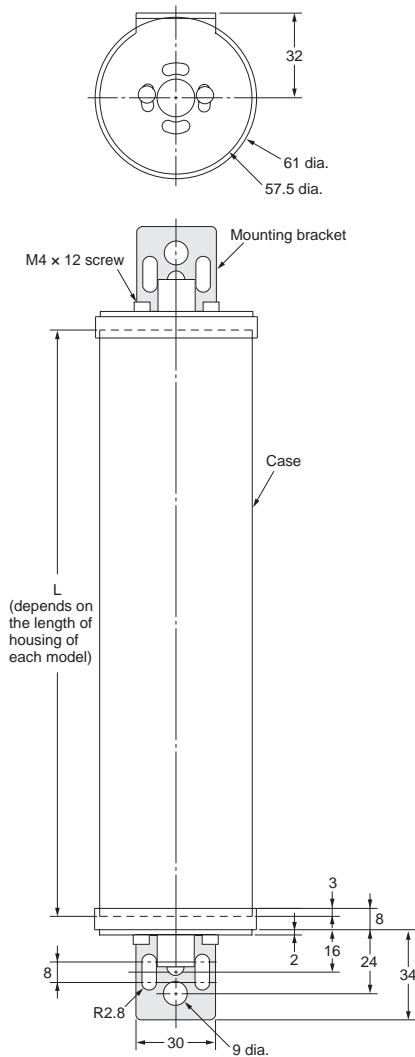
Fixing bracket



Materials: SUS

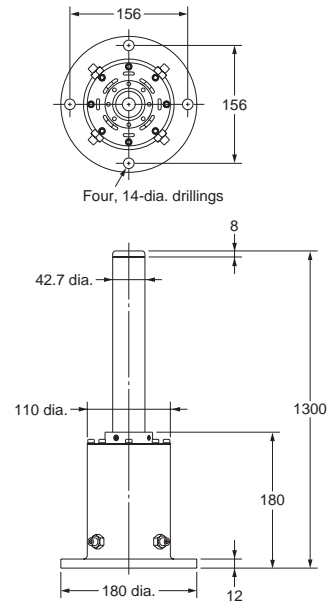
Environment-resistant enclosure

- F39-HP□□□□-14
- F39-HP□□□□-25
- F39-HPH09-03



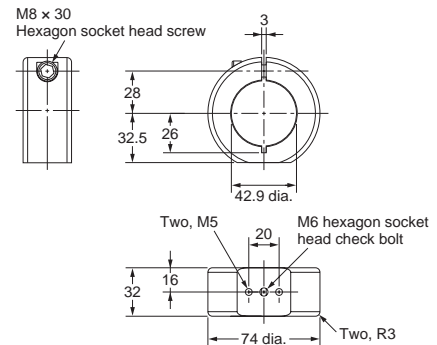
Multi-beam sensor support stand/Mirror stand

F39-ST1



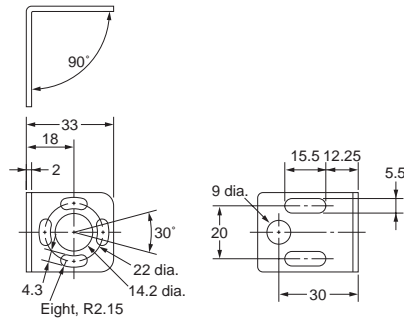
Mounting bracket

F39-L22



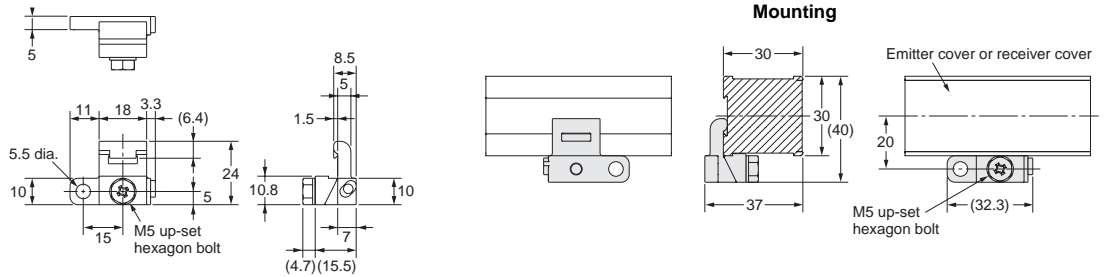
Wall mounting bracket

F39-L18



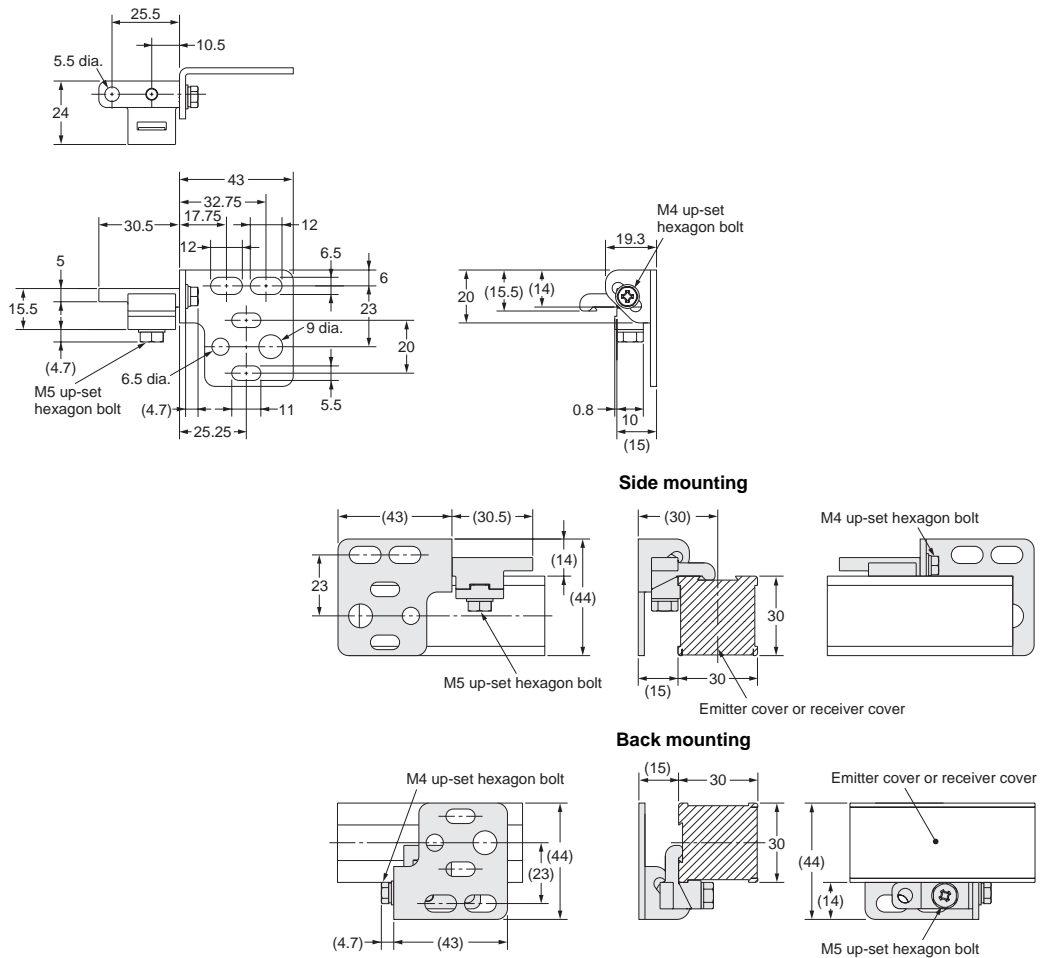
Free-location bracket

F39-L19



Free-location bracket

F39-L20



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E322-E1-3

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

OMRON Corporation

Industrial Automation Company

Application Sensors Division

Sensing Devices and Components Division H.Q.

Shiokoji Horikawa, Shimogyo-ku

Kyoto, 600-8530 Japan

Tel: (81)75-344-7068/Fax: (81)75-344-7107

Printed in Japan

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