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Machine & Process Safeguarding
Solution Selection Guide
2015-2016

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- » Light Curtains
- » Laser Scanners
- » Programmable Safety Systems
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Safety Monitoring Relays

Contents

Selection Guide

Selecting a Monitoring Relay for Your Application

Choosing the Proper Model in a Few Selection Steps

Safety monitoring relays range in function from two-hand palm button control to dual channel input units with time-delayed outputs that provide conformity to ANSI B11.19-2010, Section 6 for Performance of the Safety Related Function(s).

The following questions and charts will guide you from the various capabilities and features to the proper model number.

1   Does the application require two dual channel inputs?

Yes: See Chart Below
No: Go to Question 2

Relay Model	Terminals	Inputs †	Outputs					Operating Voltage					Catalog Page
			Safety N/O	Aux. N/C	Solid State Aux.	Safety Delayed		Operating Voltage					
						N/O	N/C	24 DC	24 AC	120 AC	200 AC	230 AC	
Safety Monitoring Relays													
SR131A	Fixed	(2) 1 N/C + 1 N/O	2	–	2	–	–	●	–	–	–	–	I-25
SR231A	Removable	(2) 1 N/C + 1 N/O	2	–	2	–	–	●	–	–	–	–	I-27

2   Does the application require one single channel or one dual channel input?

Yes: See Chart Below
No: Go to Question 3

Relay Model	Terminals	Inputs †	Outputs					Operating Voltage					Catalog Page
			Safety N/O	Aux. N/C	Solid State Aux.	Safety Delayed		Operating Voltage					
						N/O	N/C	24 DC	24 AC	120 AC	200 AC	230 AC	
Safety Monitoring Relays													
SR101A	Fixed	1 N/C, Supply Voltage	2	–	–	–	–	●	●	●	–	–	I-12
G9SA-301[1]	Fixed	1 N/C, 2 N/C, PNP	3	1	–	–	–	●	●	●	–	●	I-6
G9SA-501[1]	Fixed	1 N/C, 2 N/C, PNP	5	1	–	–	–	●	●	●	–	●	I-6
SR103AM	Fixed	1 N/C, 2 N/C, PNP	3	1	–	–	–	●	●	●	–	–	I-13
SR201A	Removable	1 N/C, Supply Voltage	3	–	1	–	–	●	●	●	–	–	I-25
SR203M/AM	Removable	1 N/C, 2 N/C, PNP	3	1	–	–	–	●	●	●	–	–	I-26

Notes:

† Codes: PNP = light curtain, 2H = two-hand control

[1] Dedicated expansion module available

● = Available   ■ = Available on special order

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Selection Guide (continued)

3 | Does the application require the ability to accept input from a variety of safety devices such as E-stops, interlocks or light curtains? | Yes: See Chart Below / No: Go to Question 4

Relay Model	Terminals	Inputs †	Outputs					Operating Voltage					Catalog Page
			Safety N/O	Aux. N/C	Solid State Aux.	Safety Delayed N/O	Safety Delayed N/C	24 DC	24 AC	120 AC	200 AC	230 AC	
Multi-Input Safety Monitoring Relays													
SR120MP	Fixed	1 N/C, 2 N/C, PNP	3	1	4	–	–	●	●	●	–	■	I-21

4 | Does the application require single or dual channel inputs with 2 or 3 delayed safety outputs? | Yes: See Chart Below / No: Go to Question 5

Relay Model	Terminals	Inputs †	Outputs					Operating Voltage					Catalog Page
			Safety N/O	Aux. N/C	Solid State Aux.	Safety Delayed N/O	Safety Delayed N/C	24 DC	24 AC	120 AC	200 AC	230 AC	
Safety Monitoring Relays with Delayed Outputs													
G9SA-321[1]	Fixed	1 N/C, 2 N/C, PNP	3	1	–	2	–	●	●	●	–	■	I-6
SR108AD	Fixed	1 N/C, 2 N/C, PNP	2	–	–	2	–	●	●	–	–	–	I-18
SR109AD	Fixed	1 N/C, 2 N/C, PNP	3	–	–	1	–	●	●	–	–	–	I-18
SR208AD	Removable	1 N/C, 2 N/C, PNP	2	–	–	3	–	●	●	●	–	■	I-26
SR209AD	Removable	1 N/C, 2 N/C, PNP	2	–	–	2	1	●	●	●	–	■	I-26

5 | Does the application require the monitoring of two-hand palm buttons? | Yes: See Chart Below / No: Go to Question 6

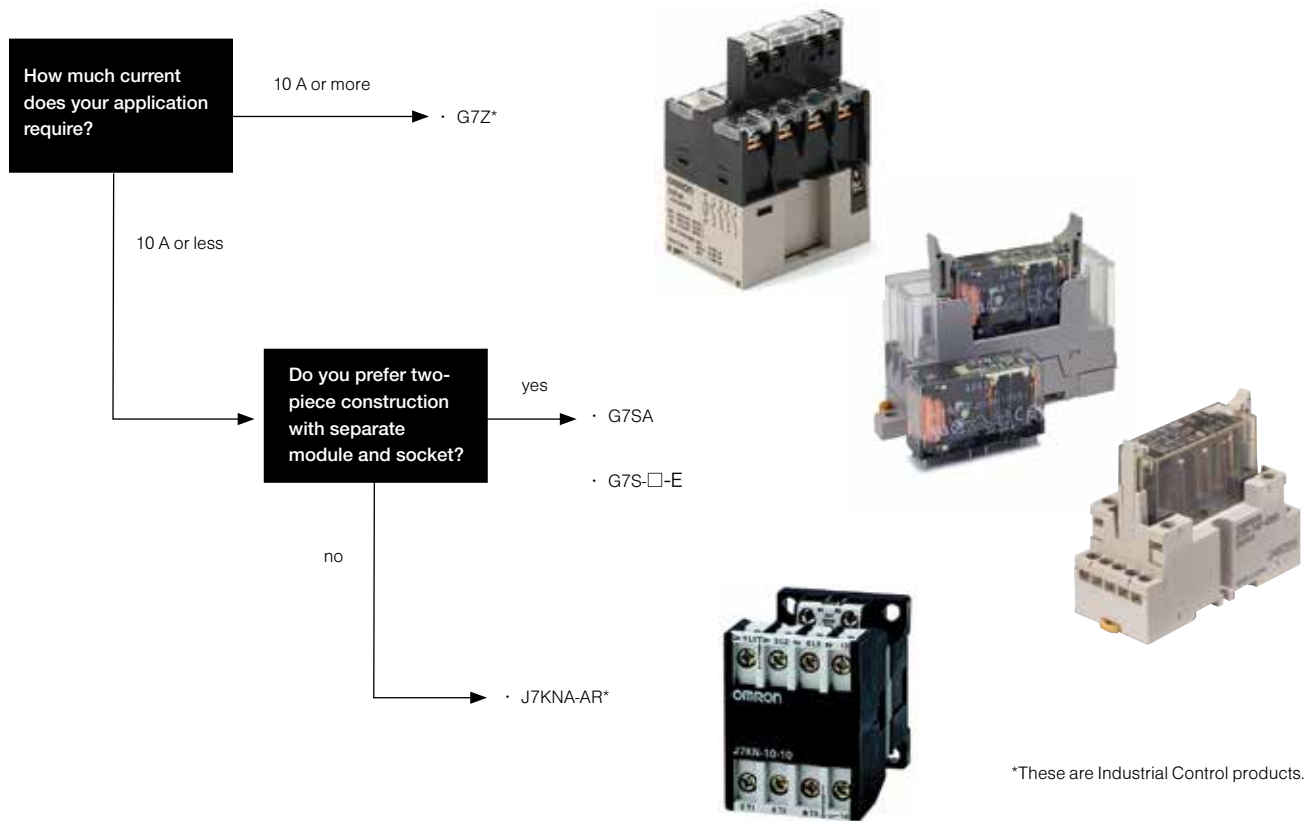| Relay Model	Terminals	Inputs †	Outputs					Operating Voltage					Catalog Page
			Safety N/O	Aux. N/C	Solid State Aux.	Safety Delayed N/O	Safety Delayed N/C	24 DC	24 AC	120 AC	200 AC	230 AC	
Two Hand Controls													
G9SA-TH301[1]	Fixed	1 N/C + 1 N/O	3	1	–	–	–	●	●	●	–	●	I-6
SR104P	Fixed	1 N/C + 1 N/O	2	–	–	–	–	●	●	●	–	–	I-17

Notes:
† Codes: PNP = light curtain, 2H = two-hand control
[1] Dedicated expansion module available
● = Available   ■ = Available on special order

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Selection Guide (continued)

6 Does the application require an expansion module?

Yes: See Chart Below
No: Go to Question 7

Relay Model	Terminals	Inputs †	Outputs							Operating Voltage				Catalog Page
			Safety N/O	Aux. N/C	Solid State			Safety Delayed						
					Safety	Aux.	Safety Delayed	N/O	N/C	24 DC	24 AC	120 AC	230 AC	
Expansion Units														
G9SA-EX031	Fixed	Dedicated	–	–	–	–	–	3	1	–	–	–	–	I-6
G9SA-EX301	Fixed	Dedicated	3	1	–	–	–	–	–	–	–	–	–	I-6
SR105E	Fixed	1 N/C, PNP	3	1	–	–	–	–	–	●	●	●	–	I-17
SR106ED	Fixed	1 N/C, PNP	–	1	–	–	–	3	–	●	●	●	–	I-21
G9SX-EX041	Removable	Dedicated	–	–	–	1	–	4	–	●	–	–	–	I-28
G9SX-EX401	Removable	Dedicated	4	–	–	1	–	–	–	●	–	–	–	I-28

7 Does the application require stop motion sensing or time "on-delay" after initiation of stop command?

Yes: See Chart Below
No: Go to Question 8

Relay Model	Terminals	Inputs †	Outputs							Operating Voltage				Catalog Page
			Safety N/O	Aux. N/C	Solid State			Safety Delayed						
					Safety	Aux.	Safety Delayed	N/O	N/C	24 DC	24 AC	120 AC	230 AC	
Stop Motion Sensing Units														
SR125SMS45	Fixed	Back EMF	1 N/O 1 N/C	–	–	2	–	–	–	●	–	●	■	I-22
SR223SMT	Removable	Time Delay	–	–	–	2	–	1	2	●	●	●	■	I-27
G9SX-SM	Removable	Back EMF	–	–	3	2	–	–	–	●	–	–	–	I-48

8 Does the application require a modular safety system?

Yes: See Chart Below
No: Please contact Omron.

Relay Model	Terminals	Inputs †	Outputs							Operating Voltage				Catalog Page
			Safety N/O	Aux. N/C	Solid State			Safety Delayed						
					Safety	Aux.	Safety Delayed	N/O	N/C	24 DC	24 AC	120 AC	230 AC	
Modular Safety Relays														
G9SX-ADA222[1]	Removable	1 N/C, 2 N/C, PNP	–	–	2	2	2	–	–	●	–	–	–	I-28
G9SX-AD322[1]	Removable	1 N/C, 2 N/C, PNP	–	–	3	2	2	–	–	●	–	–	–	I-28
G9SX-BC202	Removable	1 N/C, 2 N/C, PNP	–	–	2	2	–	–	–	●	–	–	–	I-28
G9SX-GS[1]	Removable	1 N/C, 2 N/C, PNP	–	–	2	6	2	–	–	●	–	–	–	I-38

Notes:
† Codes: PNP = light curtain, 2H = two-hand control
[1] Dedicated expansion module available
● = Available ■ = Available on special order

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Selection Guide (continued)

Selecting Force-Guided Relays & Power Contactors

How much current does your application require?

10 A or more → · G7Z*

10 A or less

Do you prefer two-piece construction with separate module and socket?

yes → · G7SA

· G7S-□-E

no

→ · J7KNA-AR*

*These are Industrial Control products.

Force-Guided Relays

Relay Series	Construction	Mounting	Poles	Rated Carry Current	Solenoid Voltage	Built in Coil Suppression	LED Indicator	Catalog Page Number
G7SA	Socket & Module	DIN Rail/PCB	4 - 6	6 A	24 VDC	—	Optional	I-49
G7S-□-E	Socket & Module	DIN Rail/PCB	4 - 6	10 A	24 VDC	—	—	I-55

Power Relays with Mirror Contacts

Mirror contacts are approved for monitoring of Safety Circuits.

Relay Series	Construction	Mounting	Poles	Rated Carry Current	Solenoid Voltage	Built in Coil Suppression	LED Indicator	Catalog Page Number
J7KNA-AR	Modules	DIN Rail	5 - 8	10 A	24 VDC, 110 VAC, 230 VAC	24 VDC models only	—	I-58
G7Z	Modules	DIN Rail	6	40 A	12 - 24 VDC	—	—	I-62

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G9SA

Safety Relay Unit

- Four kinds of 45-mm wide units are available:
  A 3-pole model, a 5-pole model, and models with 3 poles and 2 OFF-delay poles, as well as a two-hand controller.
  Also available are 17.5 mm wide expansion units with 3 poles and 3 OFF-delay poles.
- Simple expansion connection
- OFF-delay models have 15-step OFF-delay settings
- Conforms to EN standards (BG approval)
- Both DIN track mounting and screw mounting are possible

Specifications

Ratings

Power Input

	G9SA-301/TH301	G9SA-501	G9SA-321-T□
Power supply voltage	24 VAC/VDC:24 VAC, 50/60 Hz, or 24 VDC 100 to 240 VAC:100 to 240 VAC, 50/60 Hz		
Operating voltage range	85% to 110% of rated power supply voltage		
Power consumption *	24 VAC/VDC: 1.8 VA/ 1.7 W max. 100 to 240 VAC: 9 VA max.	24 VAC/VDC: 2.8 VA/ 2.6 W max. 100 to 240 VAC: 11 VA max.	24 VAC/VDC: 3.5 VA/ 3.3 W max. 100 to 240 VAC: 12.5 VA max.

*When an Expansion Unit is connected, the power consumption is increased by 2 VA/2 W max.

Inputs

	G9SA-301/321-T□/TH301	G9SA-501
Input current *	40 mA max.	60 mA max.

* When an Expansion Unit is connected, the input current is increased by 30 mA max.

Contacts

	G9SA-301/501/321-T□/TH301/EX301/EX031-T□
	Resistive load
Rated load	250 VAC, 5 A 30 VDC, 5 A
Rated carry current	5 A

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Specifications (continued)

Characteristics

		G9SA-301/TH301	G9SA-501/321-T□	G9SA-EX301/EX031-T□
Contact resistance *1		100 mΩW		
Operating time *2		30 ms max.		
Response time *3		10 ms max.		
Insulation resistance *4		100 MΩ min. (at 500 VDC)		
Dielectric strength	Between different outputs	2,500 VAC, 50/60 Hz for 1 min		
	Between inputs and outputs			
	Between power inputs and outputs			
	Between power inputs and other inputs (only for 100 to 240-V models)			
Vibration resistance		10 to 55 to 10 Hz, 0.375 mm single amplitude (0.75 mm double amplitude)		
Shock resistance	Destruction	300 m/s²		
	Malfunction	100 m/s²		
Durability *5	Mechanical	5,000,000 operations min. (at approx. 7,200 operations/hr)		
	Electrical	100,000 operations min. (at approx. 1,800 operations/hr)		
Failure rate (P Level) (reference value)		5 VDC, 1 mA		
Ambient operating temperature		-25 to 55°C (with no icing or condensation)		
Ambient operating humidity		35% to 85%		
Terminal tightening torque		0.98 N·m		
Weight *6		Approx. 210 g	Approx. 270 g	Approx. 130 g

*1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.

*2. Not including bounce time.

*3. The response time is the time it takes for the main contact to open after the input is turned OFF. Includes bounce time.

*4. The insulation resistance was measured with 500 VDC at the same places that the dielectric strength was checked.

*5. The durability is for an ambient temperature of 15 to 35°C and an ambient humidity of 25% to 75%.

*6. Weight shown is for 24-VAC/VDC type. For 100 to 240 VAC type, add approximately 20 g.

Applications

G9SA-TH301 (24 VDC) with 2-hand Inputs
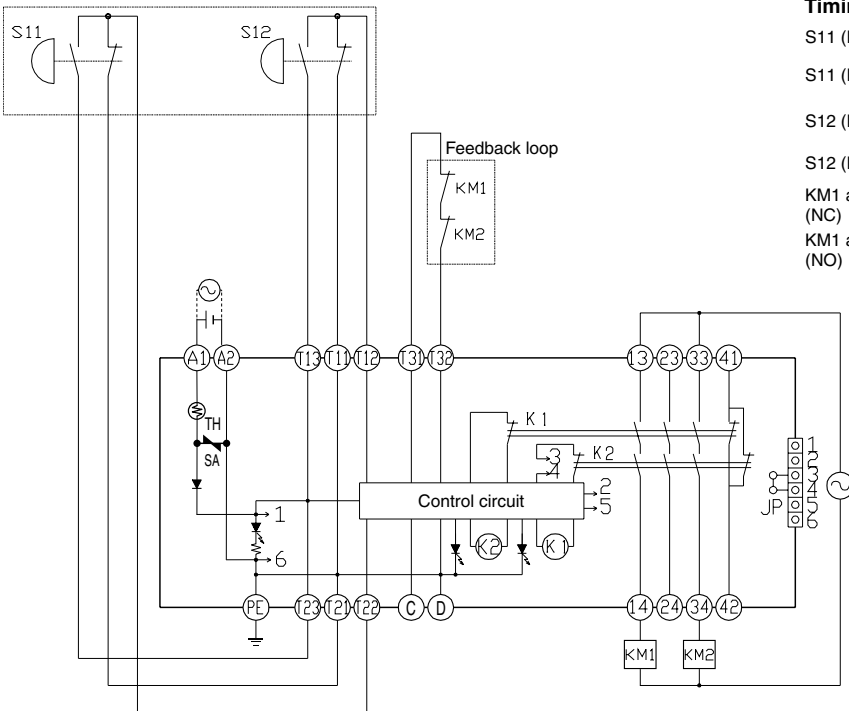
Timing Chart
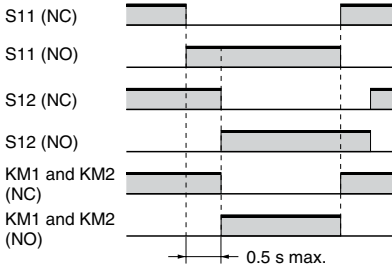
Input time difference operates only when the difference is 0.5 s max.

S11, S12:   Two-hand pushbutton switches
KM1 and KM2: Magnetic Contactor

Note: 1. Use a 1NC+1NO switch for S11 and S12.
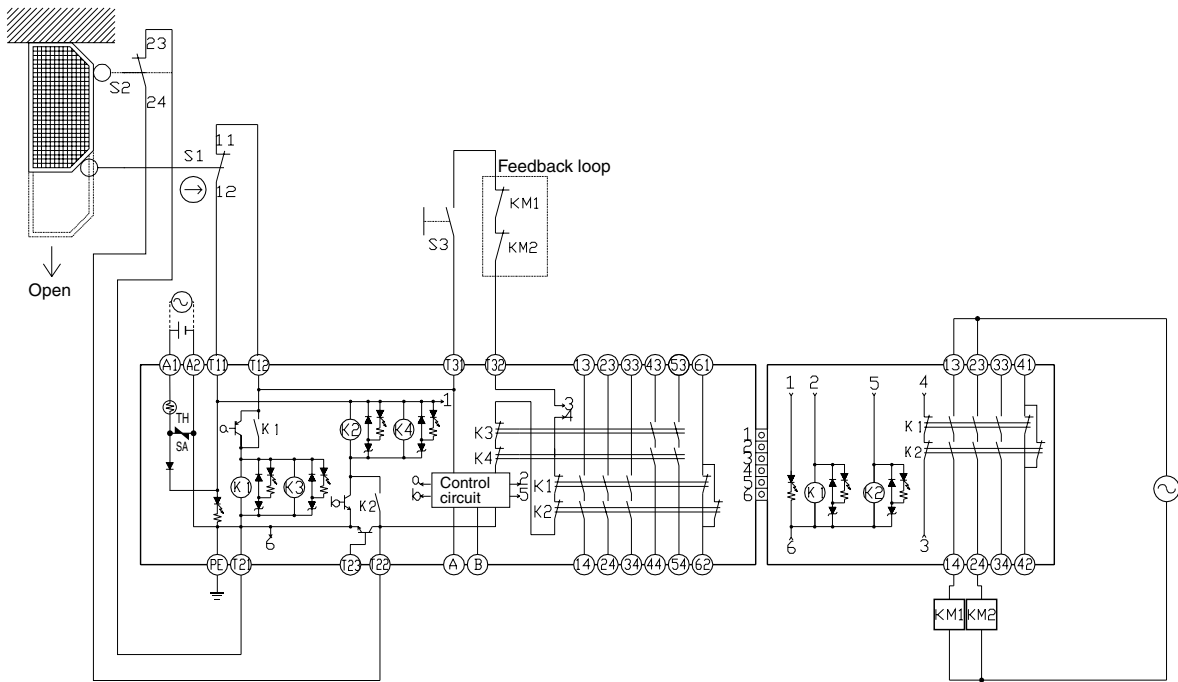
2. This circuit achieves Safety Category 4.

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Applications (continued)

G9SA-301 (24 VAC/VDC) with 2-channel Safety Sensor/Manual Reset

Timing Chart

F3SJ-A Incident Interrupted	
Reset switch S1	
K1 and K2 (NC)	
K1 and K2 (NO)	
KM1 and KM2 (NC)	
KM1 and KM2 (NO)	
PLC input	
PLC output	
KM3	

F3SJ-A: Safety sensor
S1: Reset switch
KM1 and KM2: Magnetic Contactor
KM3: G3J Solid-state Contactor (G3J)
M: 3-phase motor
E1: 24-VDC Power Supply (S82K)

Note: This circuit achieves Safety Category 4.

∗ The F3SJ-A auxiliary output wiring is shown for dark-ON operation.

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Applications (continued)

G9SA-501 (24 VAC/VDC) and G9SA-EX301 with 2-channel Limit Switch Input/Manual Reset

S1:	Safety Limit Switch with direct opening mechanism (NC) (D4B-N, D4N, D4F) ⊖
S2:	Limit switch (NO)
S3:	Reset switch
KM1 and KM2:	Magnetic Contactor
M:	3-phase motor

Timing Chart
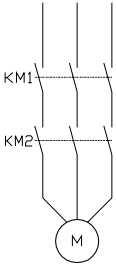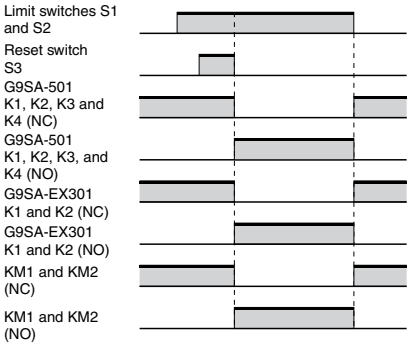
Note: This circuit achieves Safety Category 4.

Dimensions and Terminal Arrangement

(mm)

G9SA-301
G9SA-501
G9SA-321-T□
G9SA-TH301

Terminal Arrangement

G9SA-301

G9SA-501
G9SA-321-T□

G9SA-TH301

PWR (green)
K1 (green)
K2 (green)

PWR (green)
K1 (green)
K2 (green)
K3 (green)
K4 (green)

(See note 1.)

PWR (green)
K1 (green)
K2 (green)

G9SA-301: Twenty, M3
G9SA-501: Twenty-four, M3
G9SA-321-T□: Twenty-four, M3
G9SA-TH301: Twenty-one, M3

Mounting Holes

Two, 4.2 dia. or M4

84±0.3

35±0.3

(See note 1)

Connector cover ✱

Note 1: The OFF-delay time setting switch is found on the G9SA-321-T□ only.

2: The K1 to K4 indicators light when the NO contacts of internal relays K1 to K4 close.

✱ Do not remove unless an Expansion Unit is being used.

G9SA-EX301
G9SA-EX031-T□

Mounting Holes

Two, 4.2 dia. or M4

87±0.3

Terminal Arrangement

G9SA-EX301
G9SA-EX031-T□

PWR (green)
K1 (green)
K2 (green)

OFF-delay time setting switch (See note 1)

Eight, M3

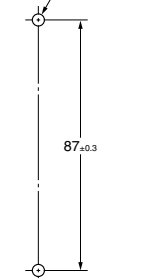OFF-delay time setting switch (See note 1)

Note 1: The OFF-delay time setting switch is found on the G9SA-EX031-T□ only.

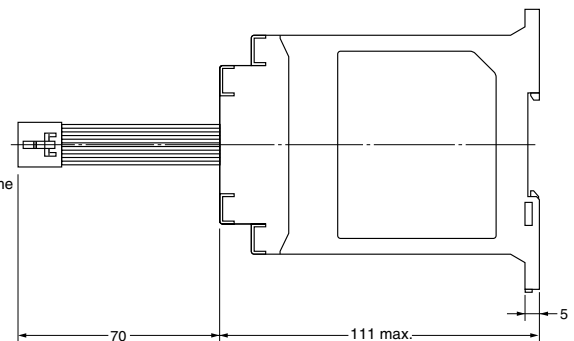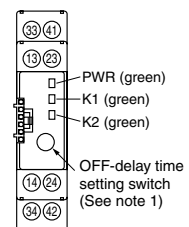**2:** The K1 and K2 indicators light when the NO contacts of internal relays K1 and K2 close.

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Ordering

Model Number Legend

G9SA – □ □ □ □ □ – □□□□
    ❶ ❷ ❸ ❹ ❺   ❻

❶ Function
   None: Emergency stop
   EX: Expansion Unit
   TH: Two-hand Controller

❷ Contact Configuration (Safety Output)
   0:     None
   3:     3PST-NO
   5:     5PST-NO

❸ Contact Configuration (OFF-delay Output)
   0:     None
   2:     DPST-NO
   3:     3PST-NO

❹ Contact Configuration (Auxiliary Output)
   0:     None
   1:     SPST-NC

❺ Input Configuration
   None: 1-channel or 2-channel input possible

❻ OFF-delay Time (Max. setting time)
   None: No OFF-delay
   T075: 7.5 seconds
   T15:   15 seconds
   T30:   30 seconds
Note: Call the factory for G9SA models designed for positive ground system. These are available for 24 VDC only.

Specific Models

Emergency-stop Units

Main contacts	Auxiliary contact	Number of input channels	Rated voltage	Model
3PST-NO	SPST-NC	1 channel or 2 channels possible	24 VAC/VDC	G9SA-301
			100 to 240 VAC	
5PST-NO			24 VAC/VDC	G9SA-501
			100 to 240 VAC	

Emergency-stop OFF-delay Units

Main contacts	OFF-delay contacts	Auxiliary contact	Number of input channels	OFF-delay time	Rated voltage	Model
3PST-NO	DPST-NO	SPST-NC	1 channel or 2 channels possible	7.5 s	24 VAC/VDC	G9SA-321-T075
					100 to 240 VAC	
				15 s	24 VAC/VDC	G9SA-321-T15
					100 to 240 VAC	
				30 s	24 VAC/VDC	G9SA-321-T30
					100 to 240 VAC	

Note: Set to maximum values in the factory.
* The following 15-step OFF-delay time settings are available:
   T075: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, and 7.5 s
   T15: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 s
   T30: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, and 30 s

Two-hand Controller

Main contacts	Auxiliary contact	Number of input channels	Rated voltage	Model
3PST-NO	SPST-NC	2 channels	24 VAC/VDC	G9SA-TH301
			100 to 240 VAC	

Expansion Unit

The Expansion Unit connects to a G9SA-301, G9SA-501, G9SA-321, or G9SA-TH301.

Main contacts	Auxiliary contact	Model
3PST-NO	SPST-NC	G9SA-EX301

Expansion Units with OFF-delay Outputs

The Expansion Unit connects to a G9SA-301, G9SA-501, G9SA-321, or G9SA-TH301.

Main contact form	Auxiliary contact	OFF-delay time	Model
3PST-NO	SPST-NC	7.5 s	G9SA-EX031-T075
		15 s	G9SA-EX031-T15
		30 s	G9SA-EX031-T30

Note: Set to maximum values in the factory.
* The following 15-step OFF-delay time settings are available:
   T075: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, and 7.5 s
   T15: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 s
   T30: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, and 30 s

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SR101A

Single-Channel Safety Monitoring Relay

· Power requirements—the SR101A will accept 24 VAC/DC or 115 VAC
· Inputs—a single N/C input channel, not monitored, is provided
· Outputs—the SR101A has two N/O outputs to route power to the coils of power contactors
· External Device Monitoring (EDM) is provided with a N/C loop between S11 and S21 on the SR101A
· Reset mode—an automatic reset mode is provided with the SR101A

Specifications

Electrical	All Models	SR101A01	SR101A02
Power Supply:	±10%, 50-60 Hz	24 VAC/DC	115 VAC
Power Consumption:	Approx. 1 VA		
Safety Inputs:	1 N/C (not monitored)		
Outputs:	2 N/O		
Output Rating AC:	Inductive AC-15, 4 A/230 V		
Output Rating DC:	Inductive DC-13, 2 A/24 V		
Min Switched Current/Voltage:	20 mA/24 V		
Impulse Withstand Voltage:	2500 V		
Max Drop-Out Time:	75 ms		
Max Output Fuse:	6 A quick-acting fuse or 4 A slow-acting		
Reset Mode:	Automatic (S11-S21)		
Contactor Monitoring:	N/C loop S11-S21		
Mechanical			
Mounting:	35 mm (1.38 in.) DIN rail		
Case Material:	Fiber-filled Polyamide PA6.6		
Max Wire Size:	1 x 2.5 mm (14 AWG) stranded		
Weight:	230 g (8.1 oz.)		
Color:	Red		
External Switches:	None		
Indication:	Green = K1 Closed, Green = K2 Closed		
Mechanical Life:	1 x 10^7 operations		
Environmental			
Enclosure Protection:	IP20 terminals, IP40 (NEMA 1) housing		
Operating Temperature:	24 VAC/DC: -15 to 60°C (5 to 140°F) 115 VAC: -15 to 40°C (-5 to 104°F)		
Humidity:	93% RH at 104°C (219°F)		
Compliance			
Standards:	EN60439-1, EN60947-1/5/7, EN61000-6, EN62061, EN ISO 13849-1		
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL, TÜV Rheinland		

Specifications are subject to change without notice.

Note:
The safety contacts of the Omron switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.

Conforms to EN60439-1, EN60947-1/5/7, EN61000-6, EN62061, EN ISO 13849-1
UL and C-UL listed
TÜV Rheinland approved

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SR103AM

Dual-Channel Safety Monitoring Relay

- Power requirements—the SR103AM will accept 24 VAC/DC or 115 VAC
- Inputs—the SR103AM will accept single or dual N/C inputs or dual inputs from a light curtain
- Outputs—the SR103AM has 3 N/O outputs to route power to the coils of power contactors, plus 1 N/C auxiliary output for signaling purposes
- External Device Monitoring (EDM) is provided with a N/C loop between S11/S12 and S21 on the SR103AM
- Monitored manual or automatic/manual reset modes are available on the SR103AM. Monitored manual reset requires closure of the reset circuit followed by opening of the circuit. Reset occurs when circuit is opened. Auto reset requires only closure of the reset circuit as reset occurs when circuit is closed.

Specifications

Conforms to EN60439-1, EN60947-1/5/7, EN61000-6, EN62061, EN ISO 13849-1
UL and C-UL listed
TÜV Rheinland approved

Electrical	All Models	SR103AM01	SR103AM02
Power Supply:	±10%, 50-60 Hz	24 VAC/DC	115 VAC
Power Consumption:	Approx. 1 VA		
Safety Inputs:	1 N/C or 2 N/C or 2 solid state (light curtain)		
Max Input Resistance:	800 Ohms per channel		
Outputs:	3 N/O + 1 N/C auxiliary		
Output Rating AC:	Inductive AC-15, 3 A/230 VAC		
Output Rating DC:	Inductive DC-13, 2 A/24 V		
Min Switched Current/Voltage:	10 mA/10 V		
Impulse Withstand Voltage:	2500 V		
Max Drop-Out Time:	12 ms (75 ms by removing supply voltage)		
Max Output Fuse:	6 A quick-acting or 4 A slow-acting		
Reset Mode:	Monitored manual (S11-S21) or automatic/manual (S12-S21)		
Contactor Monitoring:	N/C loop S11/S12-S21		
Mechanical			
Mounting:	35 mm (1.38 in.) DIN rail		
Case Material:	Fiber-filled Polyamide PA6.6		
Max Wire Size:	1 x 2.5 mm^2 (14 AWG) stranded		
Weight:	230 g (8.1 oz.)		
Color:	Red		
External Switches:	None		
Indication:	Green = K1 Closed, Green = K2 Closed		
Mechanical Life:	1 x 10^7 operations		
Environmental			
Enclosure Protection:	IP20 terminals, IP40 (NEMA 1) housing		
Operating Temperature:	24 VAC/DC: -15 to 40°C (5 to 104°F) 115 VAC: -15 to 40°C (5 to 104°F)		
Storage Temperature:	-25° to 70°C (-13 to 158°F)		
Humidity:	93% RH at 104°C (219°F)		
Compliance			
Standards:	EN60439-1, EN60947-1/5/7, EN61000-6, EN62061, EN ISO 13849-1		
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL, TÜV Rheinland		

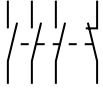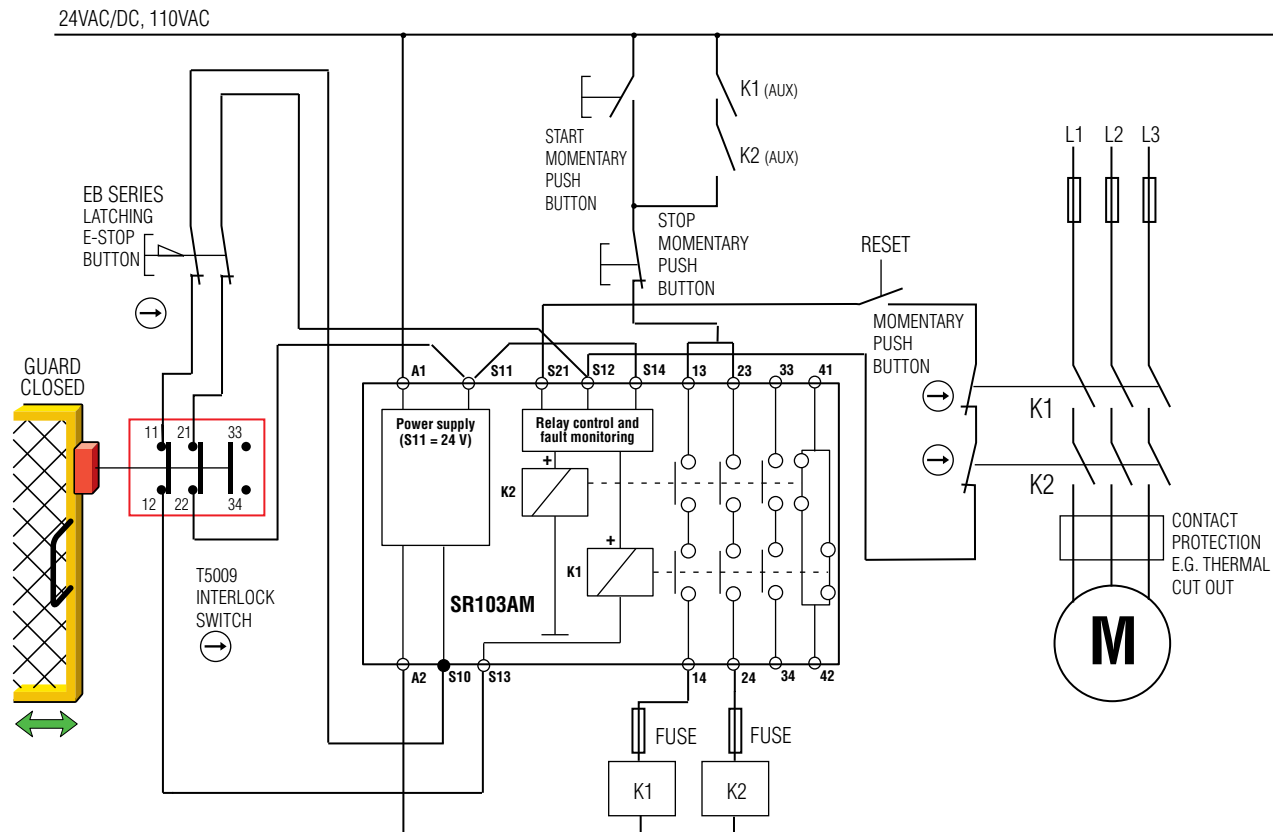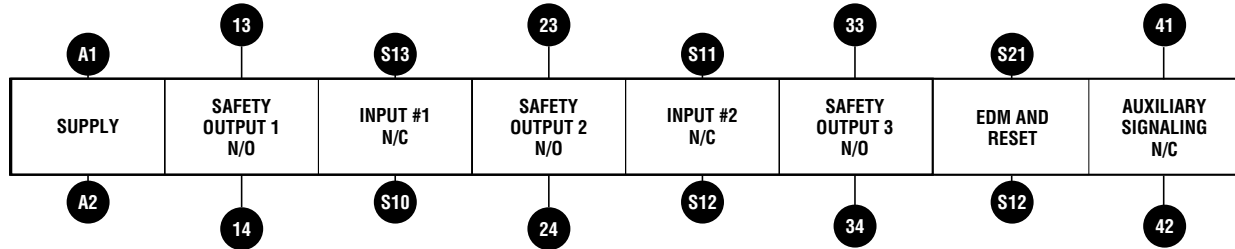Specifications are subject to change without notice.

Note:
The safety contacts of the Omron switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.

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Application

Output Contact Arrangements

Terminal Pin Assignments

14	⊘	⊘	S12		A1	⊘	⊘	13
24	⊘	⊘	S13		S11	⊘	⊘	23
34	⊘	⊘	S10		S14	⊘	⊘	33
42	⊘	⊘	A2		S21	⊘	⊘	41

Terminal Connections

A1	13	S13	23	S11	33	S21	41
SUPPLY	SAFETY OUTPUT 1 N/O	INPUT #1 N/C	SAFETY OUTPUT 2 N/O	INPUT #2 N/C	SAFETY OUTPUT 3 N/O	EDM AND RESET	AUXILIARY SIGNALING N/C
A2	14	S10	24	S12	34	S12	42

📝 For a full explanation of the circuit operating principle and fault detection, see "Common Circuit Examples" in the Expert Area Section of this catalog.

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Application (continued)

MS4600 Connected to SR103AM

(MPCE monitoring disabled)
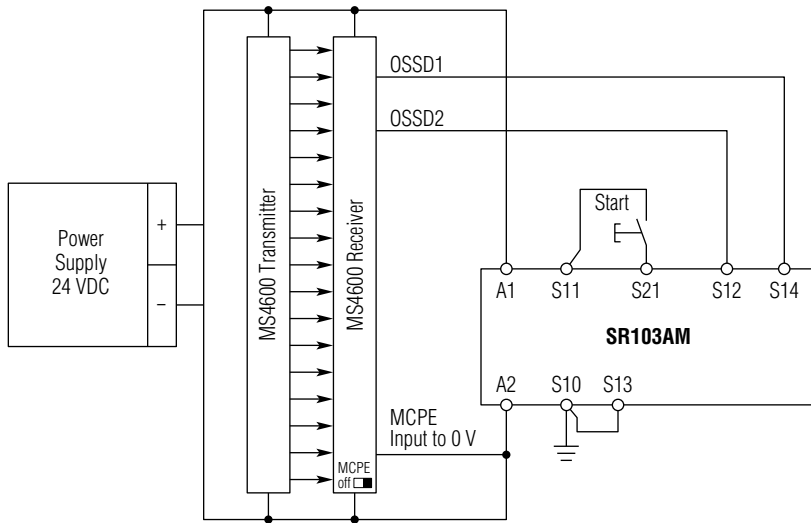
MPCE Monitoring "Disabled"

The start switch shown connected between S11 and S21 provides a monitored manual start function. Switch must be closed and then opened to activate a start. For auto-start, connect a wire between S21 and S12 and no connection between S11 and S21.

If the MPCE function is not being used on the MS4600 light curtain, the function must be "disabled", and the MPCE input wire must be connected to 0 V (GND).

MPCE Monitoring "Enabled"

When using an SR103AM with an MS4600 light curtain, MPCE monitoring may be performed through the safety monitoring relay using terminals S12, S21. This method of MPCE monitoring only allows for Auto Restart/Manual Restart Mode of the safety monitoring relay. If Monitored Manual Restart Mode with MPCE Monitoring is desired, the MPCE Monitoring must be enabled and performed through the MS4600 light curtain. Place wire jumper between terminals S12, S21 of the safety monitoring relay. Configure the MS4600 for Start/Restart Interlock Mode. The Monitored Manual Reset is now controlled through the MS4600 light curtain. (See MS4600 Manual for configuration and wiring details of MS4600 light curtain.)
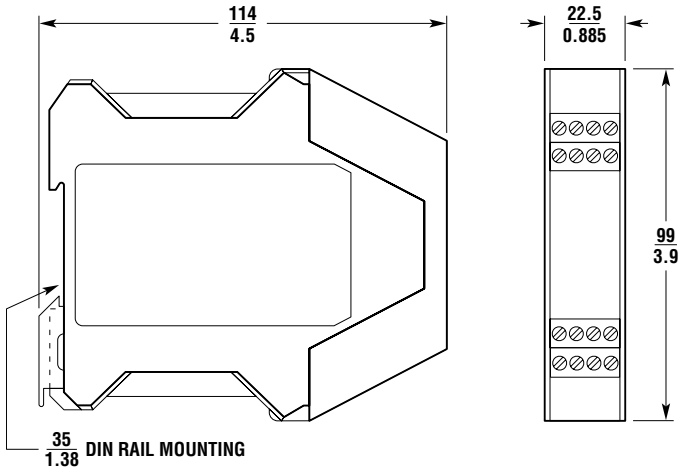
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Block Diagram

A1	S11	S21	S12	S14	13	23	33	41

Power supply (S11=24V)

Relay control and fault monitoring

K1

K2

Pin assignment

U_B	A1	A2
DC	+U_B	0V
AC	L1	N

A2 S10 S13

14 24 34 42
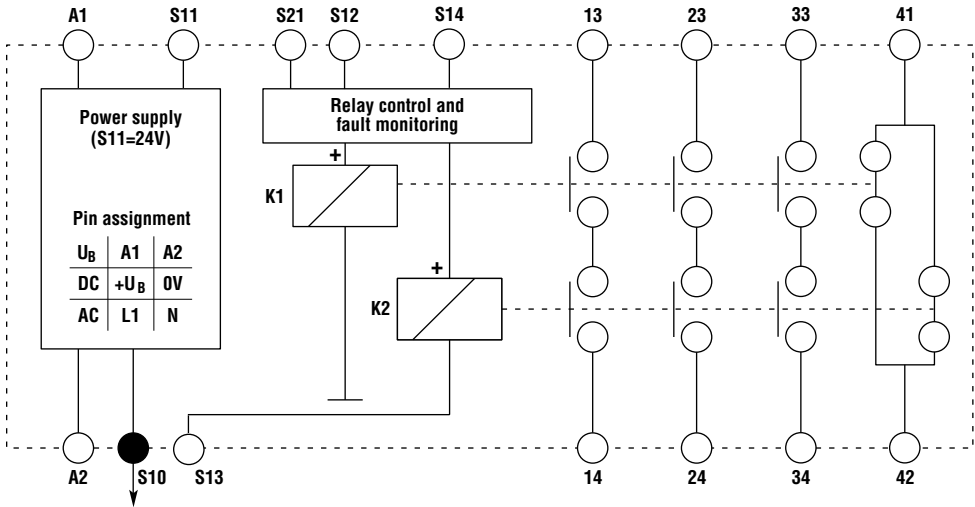
Dimensions

(mm/in.)

SR103AM

114 / 4.5

22.5 / 0.885

99 / 3.9

35 / 1.38 DIN RAIL MOUNTING

Ordering

Model	Supply	Inputs	Outputs	Auxiliary	Part No.
SR103AM01	24 VAC/DC	2 N/C	3 N/O	1 N/C	44510-1031
SR103AM02	115 VAC	2 N/C	3 N/O	1 N/C	44510-1032

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Two-Hand Control Safety Monitoring Relay

· Power requirements—the SR104P will accept 24 VAC/DC and 115 VAC
· Inputs—controls and monitors two-hand control switches to ensure that both switches are operated within 0.5 seconds of each other
· Outputs—the SR104P has 2 N/O outputs to route power to the coils of power contactors
· External Device Monitoring (EDM) is provided with a N/C loop between X1 and X2 on the SR104P

I

Safety Expansion Unit

· Power requirements—the SR105E will accept 24 VAC/DC
· Outputs—the SR105E has 3 N/O outputs to route power to the coils of power contactors plus 1 N/C auxiliary output for monitoring by the safety monitoring relay
· Expander capability—the SR105E may be used with any other SR Series relay to expand the total available number of N/O outputs to power contactors

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I-17

SR108AD & SR109AD

Dual-Channel Safety Monitoring Relay

- Power requirements—the SR108AD and SR109AD will accept 24 VAC/DC
- Inputs—the SR108AD and SR109AD will accept single or dual N/C inputs or dual PNP solid-state inputs from a light curtain
- Outputs—the SR108AD and SR109AD have a total of 4 N/O outputs with 3, 2 or 1 of the outputs with a time delay of 1-30 sec.
- External Device Monitoring (EDM) is provided with a N/C loop between S12 and S21 on the SR108AD and SR109AD
- Reset mode—a monitored manual start or an auto/manual start may be configured with the SR108AD and SR109AD. Monitored manual reset requires closure of the reset circuit followed by opening of the circuit. Reset occurs when circuit is opened. Auto reset requires only closure of the reset circuit as reset occurs when circuit is closed.
- PLC Compatible—The N/O off delayed outputs make it possible to use the SR108AD and SR109AD on machines with Programmable Logic Controllers that require some time to execute an orderly shutdown

Conforms to EN62061, EN60947-5-1,
EN ISO 13849-1, EN ISO 13849-2
UL and C-UL listed
TÜV Rheinland approved

Specifications

SR109AD **Quick Link** **S375** omron247.com

Electrical	All Models	SR108AD	SR109AD
Power Supply:	±10%, 50-60 Hz, 24 VAC/DC		
Power Consumption:	4.6 W		
Safety Inputs:	1 N/C or 2 N/C		
Max Input Resistance:	800 Ohms per channel		
Outputs:		2 N/O + 2 N/O delayed	3 N/O + 1 N/O delayed
Auxiliary Outputs:	None		
Max Switched AC:	Inductive AC-15, 3 A/250 VAC; Resistive AC-12, 8 A/250 V		
Max Switched DC:	Inductive DC-13, 3 A/24 VDC; Resistive DC-12, 8 A/50 V		
Min Switched Current/Voltage:	10 mA/24 V		
Impulse Withstand Voltage:	2500 V		
Max Drop-Out Time:	10 ms (75 ms by removing supply voltage)		
Max Output Fuse:	8 A quick-acting fuse or 6 A slow-acting fuse		
Start Mode:	Monitored manual (S11-S21) or auto/manual (S12-S21)		
External Device Monitoring (EDM):	N/C loop between S12 and S21		
Mechanical			
Mounting:	35 mm (1.38 in.) DIN rail		
Case Material:	Polyamide PA6.6		
Max Wire Size:	1 x 2.5 mm^2 (14 AWG) stranded		
Weight:	250 g (8.8 oz.)		
Color:	Red		
External Switches:	Output delay adjustment (1 to 30 sec.)		
Indication:	4, status displays for relays K1 to K4		
Mechanical Life:	1 x 10^6 operations		
Environmental			
Enclosure Protection:	IP20 terminals, IP40 (NEMA 1) housing		
Operating Temperature:	-15 to 40°C (-5 to 140°F)		
Humidity:	93% RH at 104°C (219°F)		
Compliance			
Standards:	EN62061, EN60947-5-1, EN ISO 13849-1, EN ISO 13849-2		
Approvals/Listings:	CE-marked for all applicable directives, UL and C-UL, TÜV Rheinland		

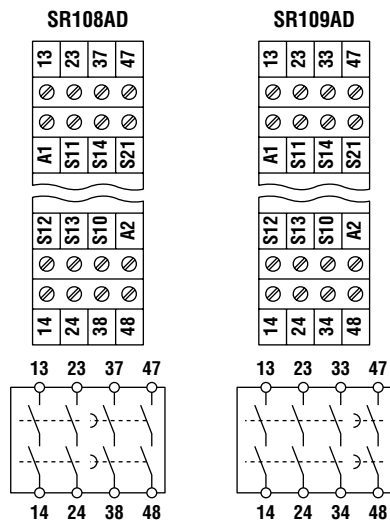Specifications are subject to change without notice.

Note: The safety contacts of the Omron switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.

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Application
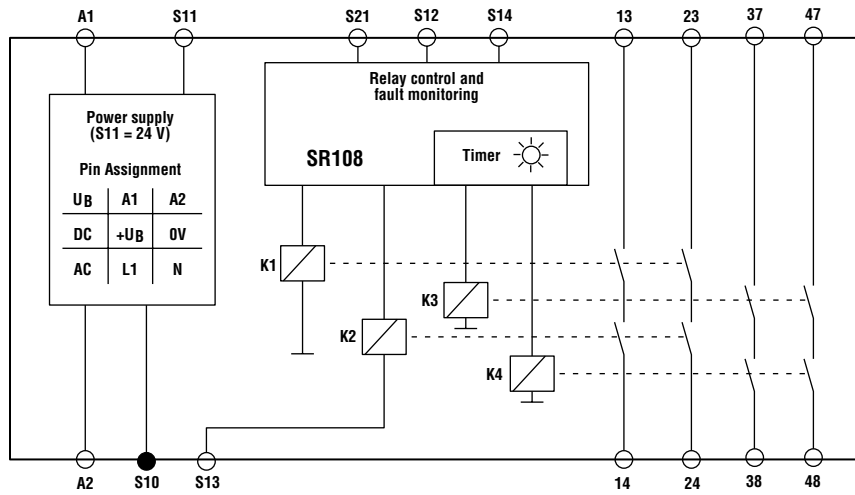
24VAC/DC, 110VAC, 230VAC
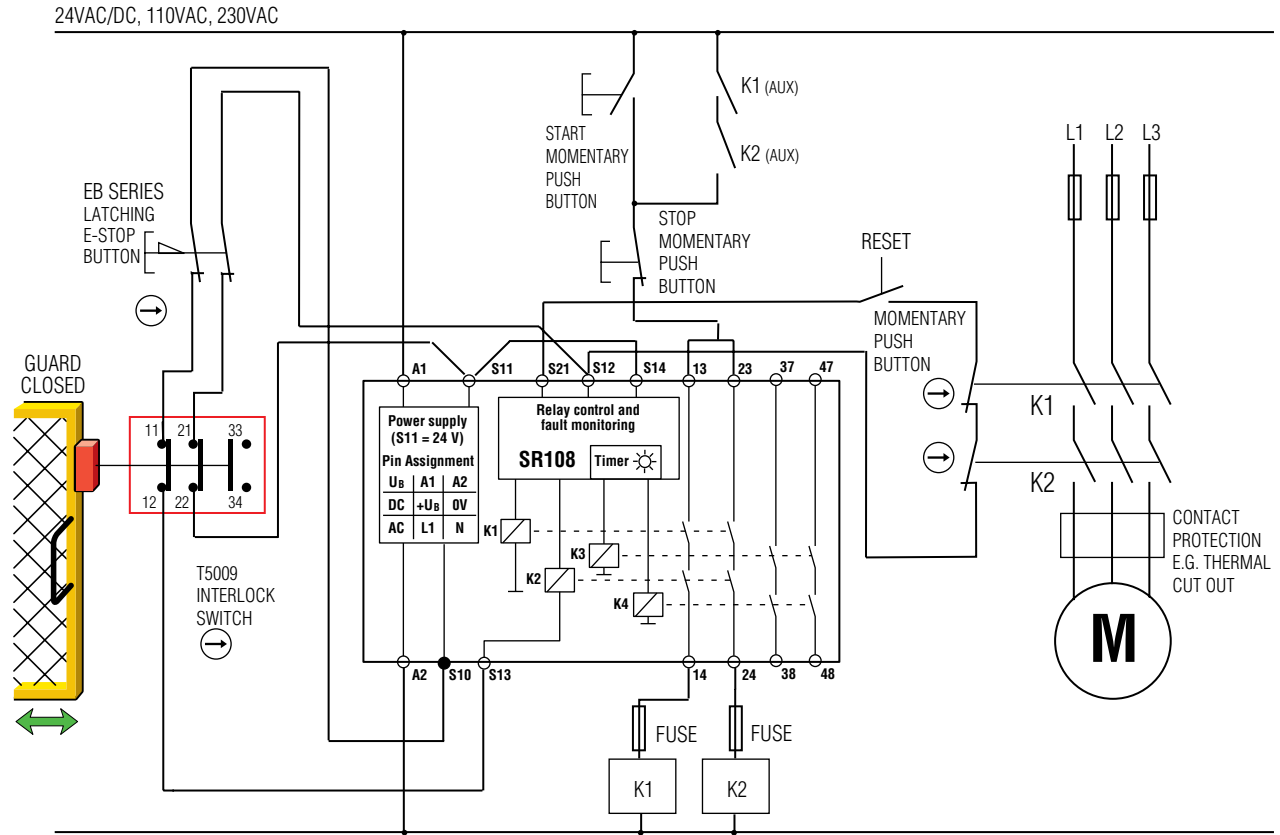
For a full explanation of the circuit operating principle and fault detection, see "Common Circuit Examples" in the Expert Area Section of this catalog.

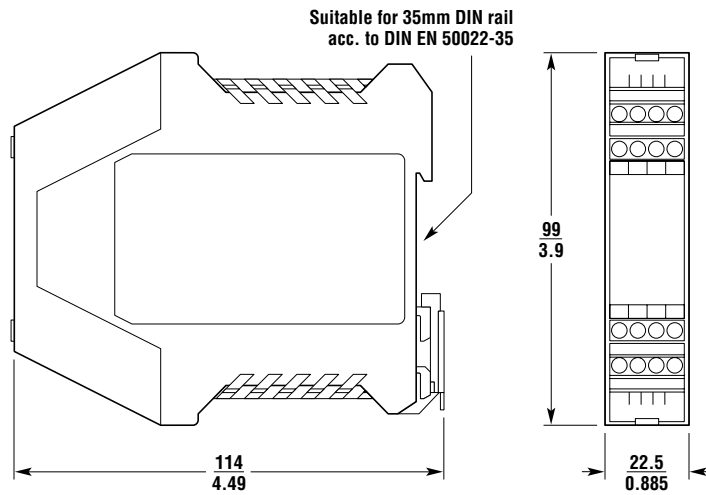## Terminal Connections and Output Contact Arrangements

SR108AD

SR109AD

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Block Diagram

Dimensions   (mm/in.)

Suitable for 35mm DIN rail
acc. to DIN EN 50022-35

99/3.9

114/4.49

22.5/0.885

Ordering

Model	Supply	Inputs	Immediate Outputs	Delayed Outputs	Part No.
SR108AD01	24 VAC/DC	2 N/C	2 N/O	2 N/O	44510-1081
SR109AD01	24 VAC/DC	2 N/C	3 N/O	1 N/O	44510-1091

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Safety Expansion Unit

· Power requirements—the SR106ED will accept 24 VAC/DC
· Outputs—the SR106ED has 3 N/O delayed outputs to route power to the coils of power contactors (delay selectable from 1 to 30 sec.)
· Auxiliary Output—the SR106ED has 1 N/C auxiliary for monitoring by the safety monitoring relay
· PLC Compatible—The N/O off delayed output makes it possible to use the SR106ED on machines with Programmable Logic Controllers that require some time to execute an orderly shutdown.

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Dual-Channel Multi-Purpose Safety Monitoring Relay

· Power requirements—the SR120MP will accept 24 VAC/DC or 110 VAC
· Inputs—the SR120MP provides dual-channel input from a variety of safety devices. The safety devices may be E-stops, interlock switches, or light curtains.
· Outputs—the SR120MP has 3 N/O outputs to route power to the coils of power contactors plus 1 N/C auxiliary output and 4 solid-state outputs for signaling purposes
· External Device Monitoring (EDM) is provided with a N/C loop between S33 and S34 on the SR120MP
· Selectable start modes—monitored manual or automatic start mode is selectable on the SR120MP

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Stop Motion Sensing Unit

· Power requirements—the SR125SMS45 will accept 24 VDC or 110 VAC
· Motion detection input—the SR125SMS45 detects the stop condition of all types of AC or DC motors by sensing the motor's back EMF across terminals Z1, Z2 and Z3
· Drive compatible—the SR125SMS45 will function with electronic motor control devices such as variable speed controllers, DC injection brakes, etc.
· Selectable speed limit—the SR125SMS45 has 1 N/O and 1 N/C outputs that are switched when motor speed reaches the adjustable preset limit (0.01 to 0.10 V) for the particular output
· Auxiliary output—the SR125SMS45 has 2 solid state auxiliary signaling outputs

Specifications

Electrical	All Models	SR125SMS4501	SR125SMS4502
Power Supply:	±10%	24 VDC	110 VAC
Power Consumption:		≤3.0 W	≤5.2 VA
Internal Fuse:	Electronic		
Safety Inputs:	Back EMF sensing between Z1 and Z2 and Z3		
Maximum Voltage Between Terminal Z1, Z2, Z3:	500 V (RMS)		
Detection Threshold:	0.01 V		
Relay Outputs:	1 N/O + 1 N/C switched at preset detection threshold		
Auxiliary Outputs:	2 solid state for signaling		
Max Switched AC:	Inductive AC-15, 1800 VA inrush, 180 VA maintained		
Max Switched DC:	Inductive DC-13, 1.2-1.5 A/24 V		
Min Switched Current/Voltage:	10 mA/17 V (provided that the contact has never been used with higher loads)		
Impulse Withstand Voltage:	4000 V		
Max Drop-Out Time:	n/a		
Max Output Fuse:	4 A slow-acting or 6 A fast-acting		
Reset Mode:	n/a		
Mechanical			
Mounting:	35 mm (1.38 in.) DIN rail		
Case Material:	Polyamide PA6.6		
Max Wire Size:	2 x 2.5 mm (14 AWG) stranded		
Weight:	AC: 0.33 kg (11.6 oz.); DC: 0.23 kg (8.1 oz.)		
Color:	Red with black body		
External Adjustment:	Motor speed preset via potentiometer		
Indication:	Green = Power On, Green = Channel 1 activated, Green = Channel 2 activated, Green = CH1 + CH2 activated		
Environmental			
Enclosure Protection:	IP20 terminals, IP40 (NEMA 1) housing		
Operating Temperature:	-10 to 55°C (14 to 131°F)		
Compliance			
Standards:	EN60947-1/5, EN61000-6, EN62061, EN62061, EN ISO 12100-2, EN ISO 13849-1/2		
Approvals/Listings:	CE-marked for all applicable directives, UL and C-UL, CSA, TÜV		

Specifications are subject to change without notice.

Note:
The safety contacts of the Omron switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.
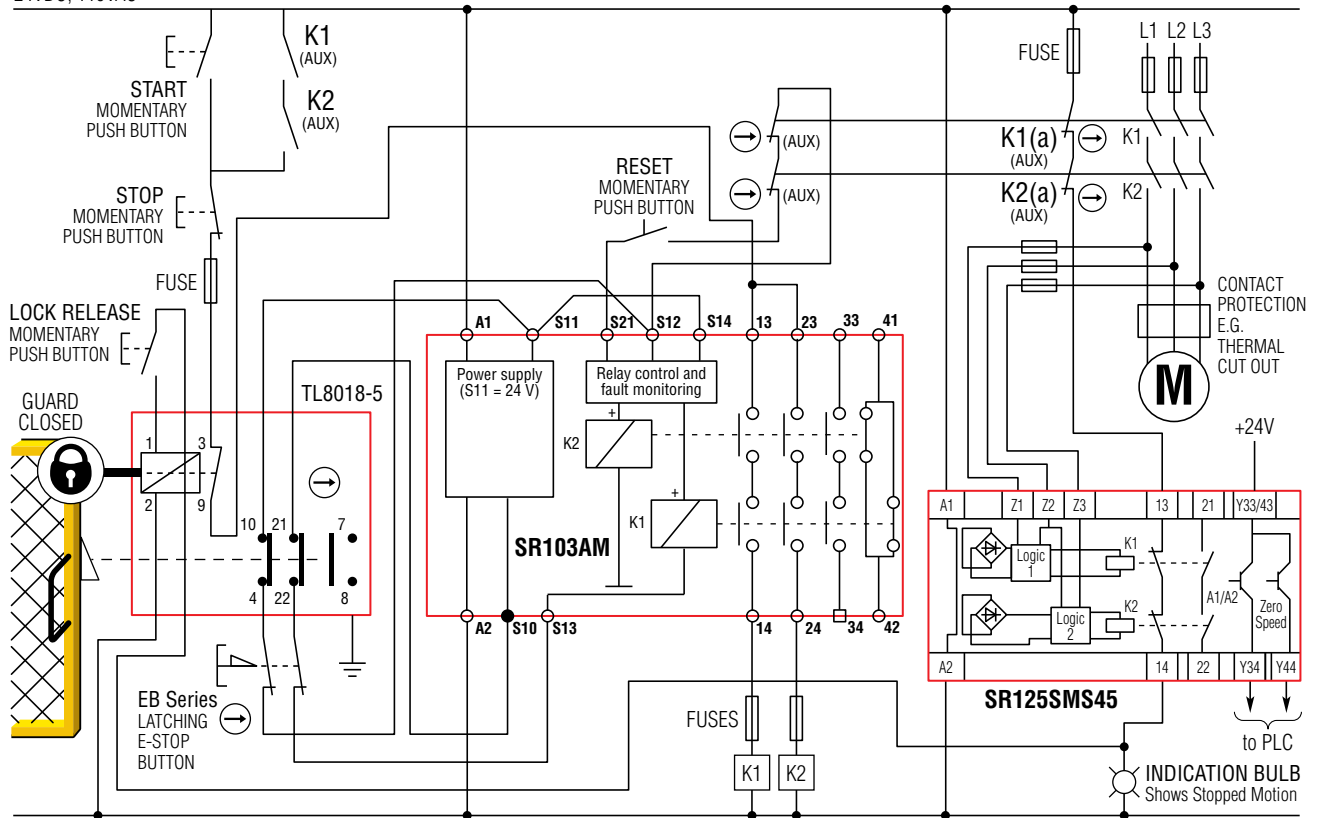
Conforms to EN60947-1/5, EN61000-6, EN62061, EN62061, EN ISO 12100-2, EN ISO 13849-1/2
UL listed
CSA and TÜV Rheinland approved

CE UL CSA TÜV Rheinland

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Application

⊕ For a full explanation of the circuit operating principle and fault detection, see "Common Circuit Examples" in the Expert Area Section of this catalog.
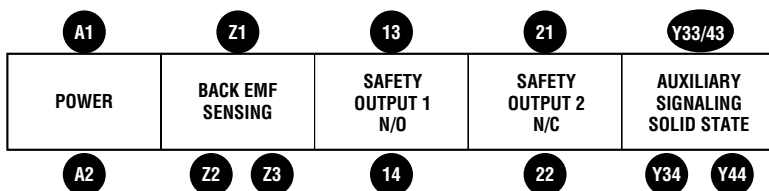
Operation
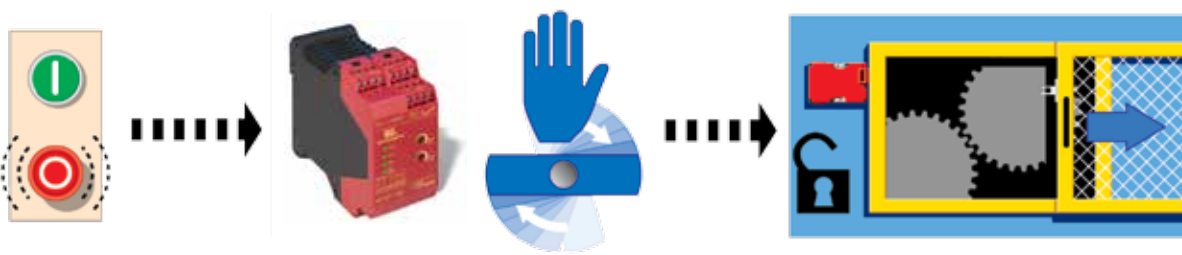
Stop signal
to motor

SM125SMS45 detects back EMF of motor and senses when hazardous motion has ceased, then signals guard locking switch to unlock
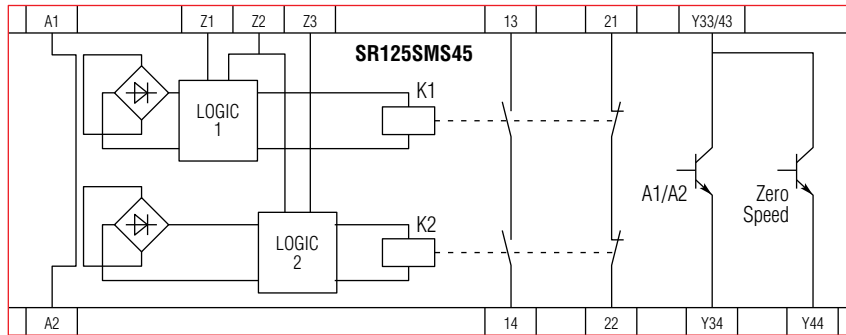
Guard locking switch unlocks guard allowing safe access to machine
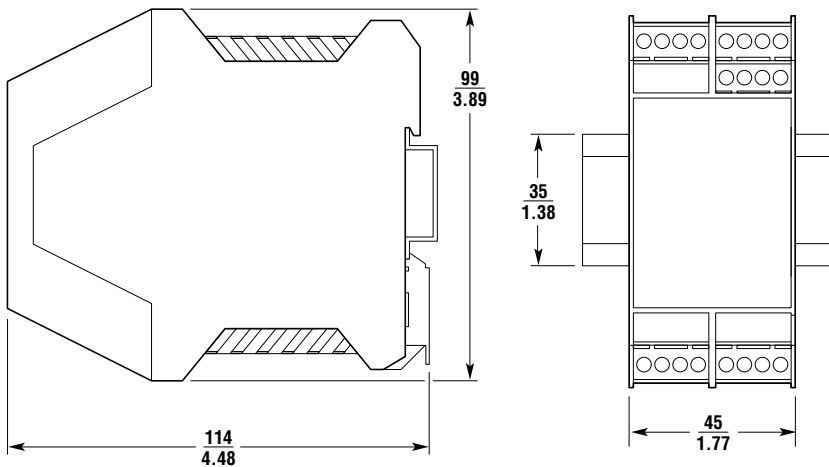
Terminal Connections

A1	Z1	13	21	Y33/43
POWER	BACK EMF SENSING	SAFETY OUTPUT 1 N/O	SAFETY OUTPUT 2 N/C	AUXILIARY SIGNALING SOLID STATE
A2	Z2 Z3	14	22	Y34 Y44

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Block Diagram

Dimensions

(mm/in.)

Ordering

Model	Supply	Inputs	Outputs	Auxiliary	Part No.
SR125SMS4501	24 VDC	Back EMF Sensing	1 N/O + 1 N/C	2 Solid State	44510-1271
SR125SMS4502	110 VAC	Back EMF Sensing	1 N/O + 1 N/C	2 Solid State	44510-1272

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Dual-Channel Safety Monitoring Relay

- Power requirements—the SR131A will accept 24 VDC
- Inputs—The SR131A is designed to monitor two magnetically encoded non-contact switches with 1 N/C and 1 N/O contacts
- Outputs—the SR131A has 2 N/O outputs to route power to the coils of external device power contactors plus 2 N/C auxiliary solid state outputs for signaling purposes
- External Device Monitoring (EDM) is provided with a N/C loop between Y1 and Y2 on the SR131A
- Selectable reset modes—automatic/manual reset mode is available on the SR131A

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Safety Monitoring Relays/Force-guided Relays
SR201A

Quick Link
S379
omron247.com

Single-Channel Safety Monitoring Relay

- Power requirements—the SR201A will accept 24 VAC/DC or 110 VAC
- Inputs—a single N/C input channel, not monitored, is provided
- Outputs—the SR201A has 3 N/O outputs to route power to the coils of power contactors plus 1 N/C auxiliary solid state output for signaling purposes
- External Device Monitoring (EDM) is provided with a N/C loop between Y1 and Y2 on the SR201A
- Selectable reset modes—automatic/manual reset mode is selectable on the SR201A
- The SR201A has removable terminals

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I-25

Dual-Channel Safety Monitoring Relay

· Power requirements—the SR203M/A will accept 24 VAC/DC or 115 VAC
· Inputs—the SR203M/A will accept single or dual N/C inputs or dual PNP inputs from a light curtain
· Outputs—the SR203M/A has 3 N/O outputs to route power to the coils of power contactors, plus 1 N/C auxiliary output for signaling purposes
· External Device Monitoring (EDM) is provided with a N/C loop between S12 and S34 on the SR203M/A
· Monitored manual or automatic/manual reset modes are available on the SR203M/A
· The SR203M/A have removable terminal blocks

SR203AM Quick Link **S383** omron247.com

Dual-Channel Safety Monitoring Relay

· Power requirements—the SR208AD/209AD will accept 24 VAC/DC or 115 VAC,
· Inputs—the SR208AD/209AD will accept single or dual N/C inputs or dual PNP inputs from a light curtain
· Outputs—the SR208AD has 2 N/O immediate outputs plus 3 N/O delayed outputs. The SR209AD has 2 N/O immediate outputs plus 2 N/O and 1 N/C delayed outputs to route power to the coils of power contactors (selectable from 0.5 to 10 sec).
· External Device Monitoring (EDM) is provided with a N/C loop between Y1 and Y2 on the SR208AD/209AD
· Reset mode—monitored manual or automatic/manual reset modes are available on the SR208/209AD
· PLC Compatible—The N/O off delayed outputs make it possible to use the SR208AD/209AD on machines with Programmable Logic Controllers that require some time to execute an orderly shutdown. The N/C on delayed output of the SR209AD may be used to apply power for unlocking a solenoid locking switch.
· The SR208AD/209AD have removable terminal blocks

SR209AD Quick Link **S385** omron247.com

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SR223SMT

Safety Module Timer Unit

- Power requirements—the SR223SMT will accept 24 VAC/DC or 115 VAC
- Delayed outputs—the SR223SMT has 1 N/O on-delay output, plus 2 N/C off-delay outputs (selectable from 1 second to 31 seconds) to provide delayed unlocking of solenoid locking switches; the delay time begins when power is applied to the SR223SMT
- Monitoring outputs—the SR223SMT has 2 solid-state signaling outputs
- External Device Monitoring (EDM) is provided with a N/C loop between Y1 and Y2 on the SR223SMT
- Diagnostic LEDs provide status inducation of supply power, safety outputs, feedback loop, and time delay

SR231A

Dual-Channel Safety Monitoring Relay

- Power requirements—the SR231A will accept 24 VDC
- Inputs—The SR231A is designed to monitor two magnetically encoded non-contact switches with 1 N/C and 1 N/O contacts
- Outputs—the SR231A has 2 N/O outputs to route power to the coils of external device power contactors plus 2 N/C auxiliary solid state outputs for signaling purposes
- External Device Monitoring (EDM) is provided with a N/C loop between Y1 and Y2 on the SR231A
- Selectable reset modes—automatic/manual reset mode is available on the SR231A
- The SR231A has removable terminal blocks

G9SX

Flexible Safety Unit

· Logical AND functions adds flexibility to I/O expansion
· Facilitates partial or complete control system setup.
· Solid-state outputs (excluding Expansion Units).
· Detailed LED indications enable easy diagnosis.
· TÜV Product Service certification for compliance with IEC/EN61508 (SIL3) and EN954-1 (Cat. 4).
· Approved by UL and CSA.
· New unit joins the Series with the following two additional features:
  - OFF-delay time of up to 150 seconds
    (The OFF-delay output also complies with Cat. 4.)
  - Two logical AND connection inputs

Specifications

Ratings

Power Input

	G9SX-AD322-☐/ADA222-☐	G9SX-BC202-☐	G9SX-EX-☐
Rated supply voltage	24 VDC		
Operating voltage range	-15% to 10% of rated supply voltage		
Rated power consumption*	4 W max.	3 W max.	2 W max.

*Power consumption of loads not included.

Inputs

	G9SX-AD322-☐/ADA222-☐	G9SX-BC202-☐
Safety input	Operating voltage: 20.4 VDC to 26.4 VDC, internal impedance: approx. 2.8 kW	
Feedback/reset input		

Outputs

	G9SX-AD322-☐/ADA222-☐	G9SX-BC202-☐
Instantaneous safety output *1 OFF-delayed safety output *1	P channel MOS FET transistor output Load current: Using 2 outputs or less: 1 A DC max. *2 Using 3 outputs or more: 0.8 A DC max.	P channel MOS FET transistor output Load current: Using 1 output: 1 A DC max. *2 Using 2 outputs: 0.8 A DC max.
Auxiliary output	PNP transistor output Load current: 100 mA max.	

*1. While safety outputs are in the ON state, the following signal sequence is output continuously for diagnosis. When using the safety outputs as input signals to control devices (i.e. Programmable Controllers), consider the OFF pulse shown below.

*2. The following derating is required when Units are mounted side-by-side.
G9SX-AD322-☐/G9SX-ADA222-☐/G9SX-BC202-☐: 0.4 A max. load current

ON
OFF
Approx. 100 ms
360 μs max.
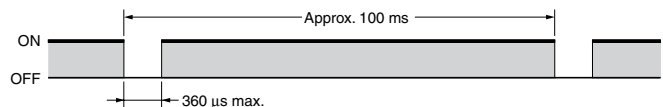
Expansion Unit Ratings

	G9SX-EX-☐
Rated load	250 VAC, 3A/30 VDC, 3A (resistive load)
Rated carry current	3 A
Maximum switching voltage	250 VAC, 125 VDC

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Specifications (continued)

Characteristics

		G9SX-AD322-□/ADA222-□	G9SX-BC202-□	G9SX-EX-□
Overvoltage category (IEC/EN 60664-1)		II		II (Safety relay outputs 13 to 43 and 14 to 44: III)
Operating time (OFF to ON state) (See note 1.)		50 ms max. (Safety input: ON) (See note 2.) 100 ms max. (Logical AND connection input: ON) (See note 3.)	50 ms max. (Safety input: ON)	30 ms max. (See note 4.)
Response Time (ON to OFF state) (See note 1.)		15 ms		10 ms max. (See note 4.)
ON-state residual voltage		3.0 V max. (safety output, auxiliary output)		
OFF-state leakage current		0.1 mA max. (safety output, auxiliary output)		
Maximum wiring length of safety input and logic AND input		100 m max. (External connection impedance: 100 Ω max. and 10 nF max.)		
Reset input time (Reset button pressing time)		100 ms min.		
Accuracy of OFF-delay time (See note 5.)		Within ±5% of the set value	–	Within ±5% of the set value
Insulation resistance	Between logical AND connection terminals, and power supply input terminals and other input and output terminals connected together	20 MΩ min. (by 100 VDC)	–	–
	Between all terminals connected together and DIN track		20 mΩ min. (at 100 VDC)	100 mΩ min. (at 500 VDC)
Dielectric strength	Between logical AND connection terminals, and power supply input terminals and other input and output terminals connected together	500 VAC for 1 min.	–	–
	Between all terminals connected together and DIN track		500 VAC for 1 min.	1,200 VAC for 1 min.
	Between different poles of outputs	–	–	
	Between safety relay outputs connected together and other terminals connected together			2,200 VAC for 1 min.
Vibration resistance		Frequency: 10 to 55 Hz, 0.375-mm single amplitude (0.75-mm double amplitude)		
Shock resistance	Destruction	300 m/s²		
	Malfunction	100 m/s²		
Durability	Electrical	–		100,000 cycles min. (rated load, switching frequency: 1,800 cycles/hour)
	Mechanical	–		5,000,000 cycles min. (switching frequency: 7,200 cycles/hour)
Ambient operating temperature		-10 to 55°C (with no icing or condensation)		
Ambient operating humidity		25% to 85%		
Terminal tightening torque (See note 6.)		0.5 N·m		
Weight		Approx. 200 g	Approx. 125 g	Approx. 165 g

Notes:

1. When two or more Units are connected by logical AND, the operating time and response time are the sum total of the operating times and response times, respectively, of all the Units connected by logical AND.

2. Represents the operating time when the safety input turns ON with all other conditions set.

3. Represents the operating time when the logical AND input turns ON with all other conditions set.

4. This does not include the operating time or response time of Advanced Units that are connected.

5. This does not include the operating time or response time of internal relays in the G9SX-EX-□.

6. For the G9SX-□-RT (with screw terminals) only.

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Specifications (continued)

Logical AND Connection

|	G9SX-AD322-☐/ADA222-☐	G9SX-BC202-☐	G9SX-EX-☐
Number of Units connected per logical AND output	4 Units max.		—
Total number of Units connected by logical AND *1	20 Units max.		—
Number of Units connected in series by logical AND	5 Units max.		—
Max. number of Expansion Units connected *2	—		5 Units max.
Maximum cable length for logical AND input	100 m max.		—

Note: See Logical AND Connection Combinations below for details.
*1. The number of G9SX-EX401-☐ Expansion Units or G9SX-EX041-T-☐ Expansion Units (OFF-delayed Model) not included.
*2. G9SX-EX401-☐ Expansion Units and G9SX-EX041-T-☐ Expansion Units (OFF-delayed Model) can be mixed.

Logical AND Connection Combinations

1. One logical AND connection output from an Advanced Unit G9SX-AD can be logical AND connected to up to four Advanced Units.
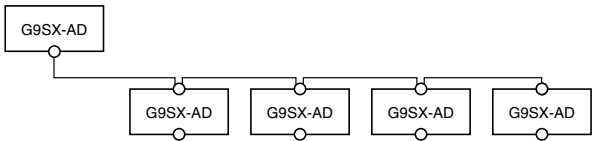
2. Two logical AND outputs from a Basic Unit G9SX-BC can be logical AND connected to up to eight Advanced Units.
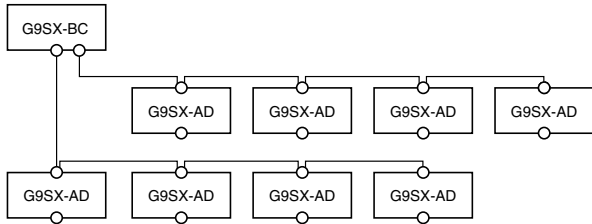
3. Two logical AND outputs from an Advanced Unit G9SX-ADA can be logical AND connected to up to eight Advanced Units.
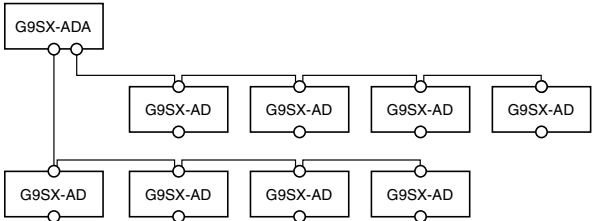
4. Any Advanced Unit with logical AND input can be logical AND connected to Advanced Units on up to five tiers.
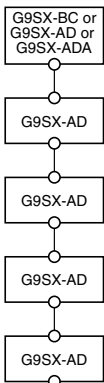
5. Two logical AND connection outputs, each from different Advanced/Basic Units, can be logical AND connected to a single G9SX-ADA Unit.
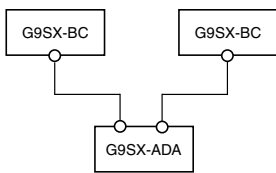
6. The largest possible system configuration contains a total of 20 Advanced and Basic Units. In this configuration, each Advanced Unit can have up to five Expansion Units.

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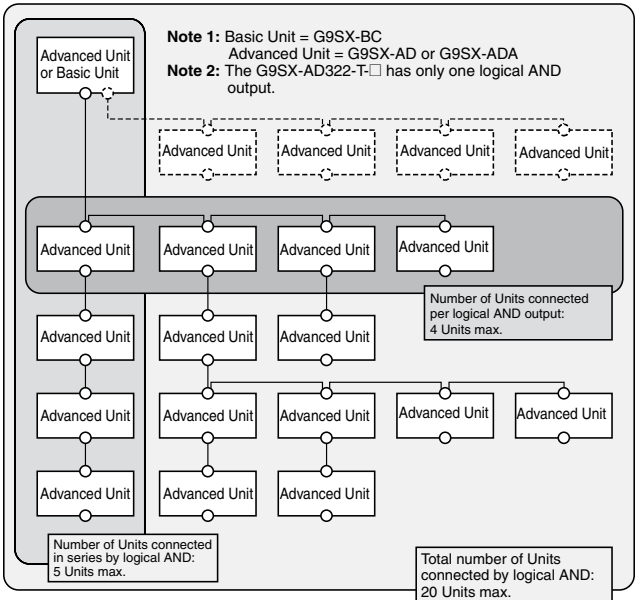
Wiring

Internal Connection

G9SX-AD322-☐ (Advanced Unit)
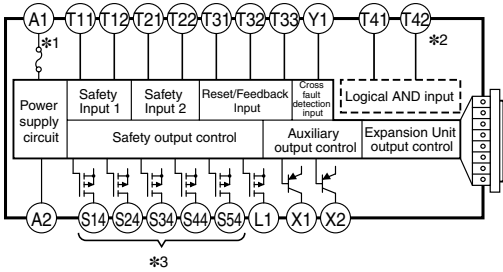
*1. Internal power supply circuit is not isolated.
*2. Logical AND input is isolated.
*3. Outputs S14 to S54 are internally redundant.
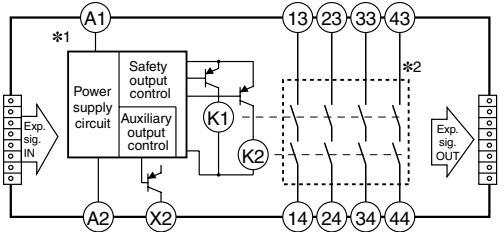
G9SX-ADA222-☐ (Advanced Unit)
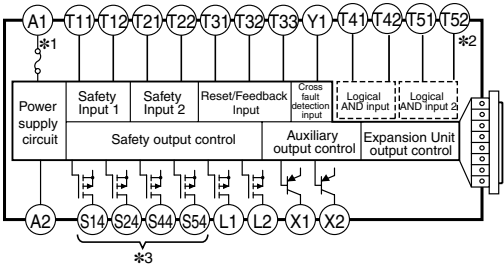
*1. Internal power supply circuit is not isolated.
*2. Logical AND inputs are isolated.
*3. Outputs S14 to S54 are internally redundant.

G9SX-BC202-☐ (Basic Unit)
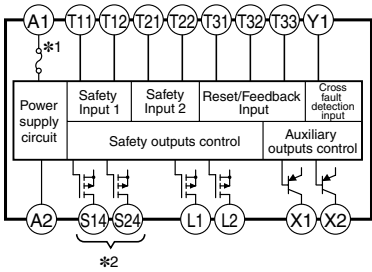
*1. Internal power supply circuit is not isolated.
*2. Outputs S14 and S24 are internally redundant.

G9SX-EX401-☐/G9SX-EX041-T-☐ (Expansion Unit / Expansion Unit OFF-delayed model)

*1. Internal power supply circuit is not isolated.
*2. Relay outputs are isolated.

Dimensions

Advanced Unit
G9SX-AD322-□
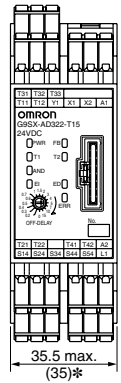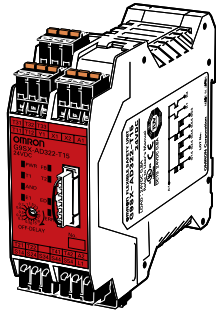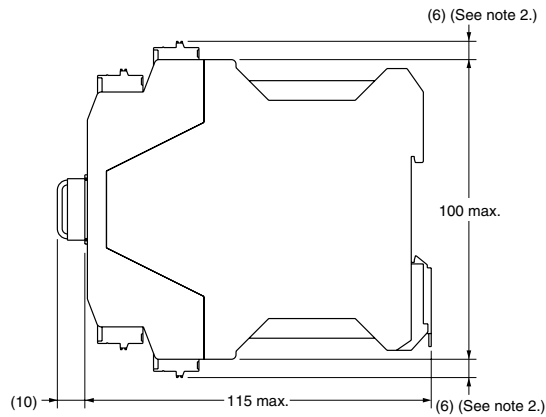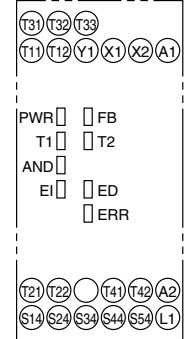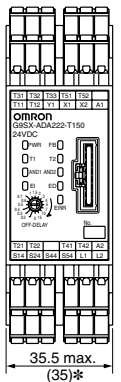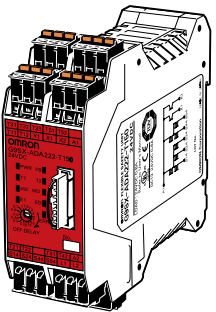
100 max.
(6) (See note 2.)
35.5 max.
(35)*
(10)
115 max.
(6) (See note 2.)
* Typical dimension

Terminal arrangement

| T31 | T32 | T33 | | | |
| T11 | T12 | Y1 | X1 | X2 | A1 |

PWR □ □ FB
T1 □ □ T2
AND □
EI □ □ ED
□ ERR

| T21 | T22 | ○ | T41 | T42 | A2 |
| S14 | S24 | S34 | S44 | S54 | L1 |

Advanced Unit
G9SX-ADA222-□

100 max.
(6) (See note 2.)
35.5 max.
(35)*
(10)
115 max.
(6) (See note 2.)
* Typical dimension

Terminal arrangement

| T31 | T32 | T33 | T51 | T52 | ○ |
| T11 | T12 | Y1 | X1 | X2 | A1 |

PWR □ □ FB
T1 □ □ T2
AND1 □ □ AND2
EI □ □ ED
□ ERR

| T21 | T22 | ○ | T41 | T42 | A2 |
| S14 | S24 | S44 | S54 | L1 | L2 |

Basic Unit
G9SX-BC202-□

100 max.
(6) (See note 2.)
23 max.
(22.5)*
115 max.
(6) (See note 2.)
* Typical dimension

Terminal arrangement

| T31 | T32 | T33 | Y1 |
| T11 | T12 | X1 | A1 |

PWR □ □ FB
T1 □ □ T2
EI □ □ ERR

| T21 | T22 | X2 | A2 |
| S14 | S24 | L1 | L2 |

Notes:
1. Above outline drawing is for -RC terminal type.
2. For -RC terminal type only.

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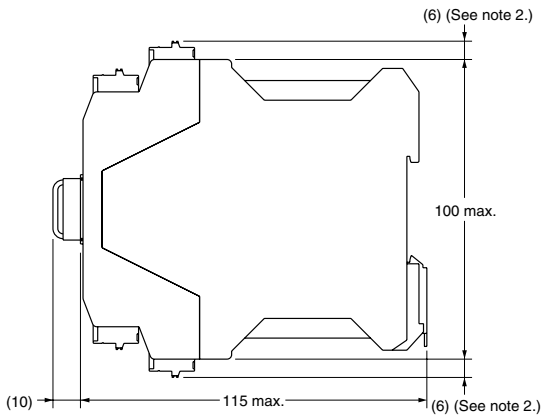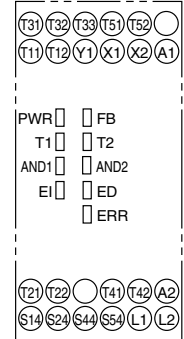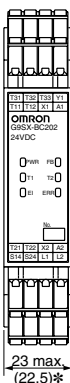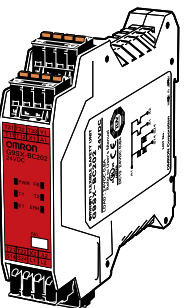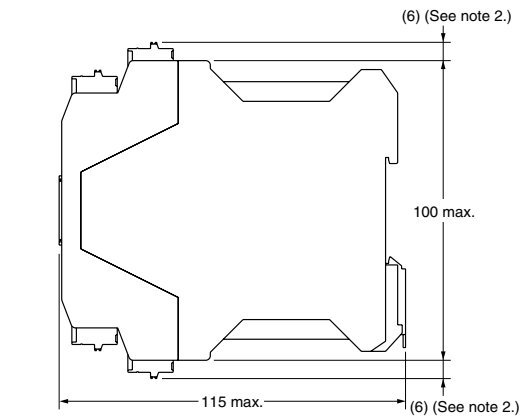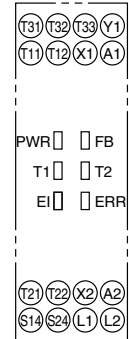
Dimensions (continued)

(mm)

Expansion Unit
G9SX-EX401-☐
Expansion Unit (OFF-delayed Model)
G9SX-EX041-T-☐

Terminal arrangement

G9SX-EX401-☐ (Expansion Unit)

G9SX-EX041-T-☐ (Expansion Unit with OFF Delay)

(6) (See note 2.)

100 max.

115 max.

(6) (See note 2.)

23 max. (22.5)✽

✽ Typical dimension

13 23 33 43

☐PWR
☐EI
☐ERR

A1 X2 A2
14 24 34 44

13 23 33 43

☐PWR
☐ED
☐ERR

A1 X2 A2
14 24 34 44
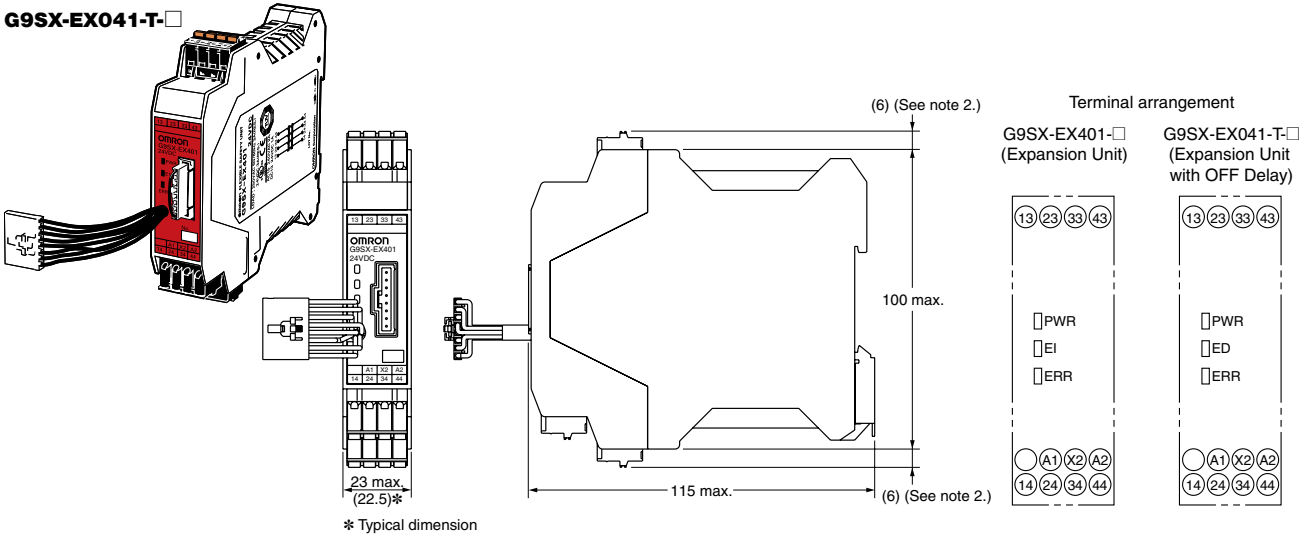
Notes:
1. Above outline drawing is for -RC terminal type.
2. For -RC terminal type only.

Applications

G9SX-AD322-T15

**(24 VDC) (2-channel Safety Sensor / Auto Reset)**

Emitter F3SJ-A Receiver

Feedback Loop

KM1
KM2
KM3
KM4

GND

OSSD1 OSSD2

NC NC +24 V +24 V NC NC AND OFF

Motor controller ← S34

KM1 --- KM3 ---
KM2 --- KM4 ---

M1 M2

A1 T11 T12 T21 T22 T31 T32 T33 Y1 T41 T42

G9SX-AD322-T15

+24 V

Control circuit

A2 S14 S24 S34 S44 S54 L1 X1 X2

KM1 KM2 KM3 KM4 PLC etc.

GND

Motor controller (Operation command)

F3SJ-A: Safety sensor
KM1 to KM4: Contactor
M1, M2:   3-phase motor

Timing chart

Safety sensor outputs

Unit S14, S24, S34

Unit S44, S54

KM1, KM2 N.C. contact

KM3, KM4 N.C. contact

KM1, KM2 N.O. contact

KM3, KM4 N.O. contact

Operation command

Rotation of motor

Off-delay time

Notes:
1. This example corresponds to category 4.
2. For further information of settings and wiring, refer to the catalog or instruction manual of the connected sensor.
3. Use safety sensors with PNP outputs.

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Applications (continued)

G9SX-AD322-T15 (24 VDC) + G9SX-EX041-T
(24 VDC) (Guard Lock Safety Door Switch (Mechanical Lock), (2-channel Safety Limit Switch Inputs / Manual Reset)
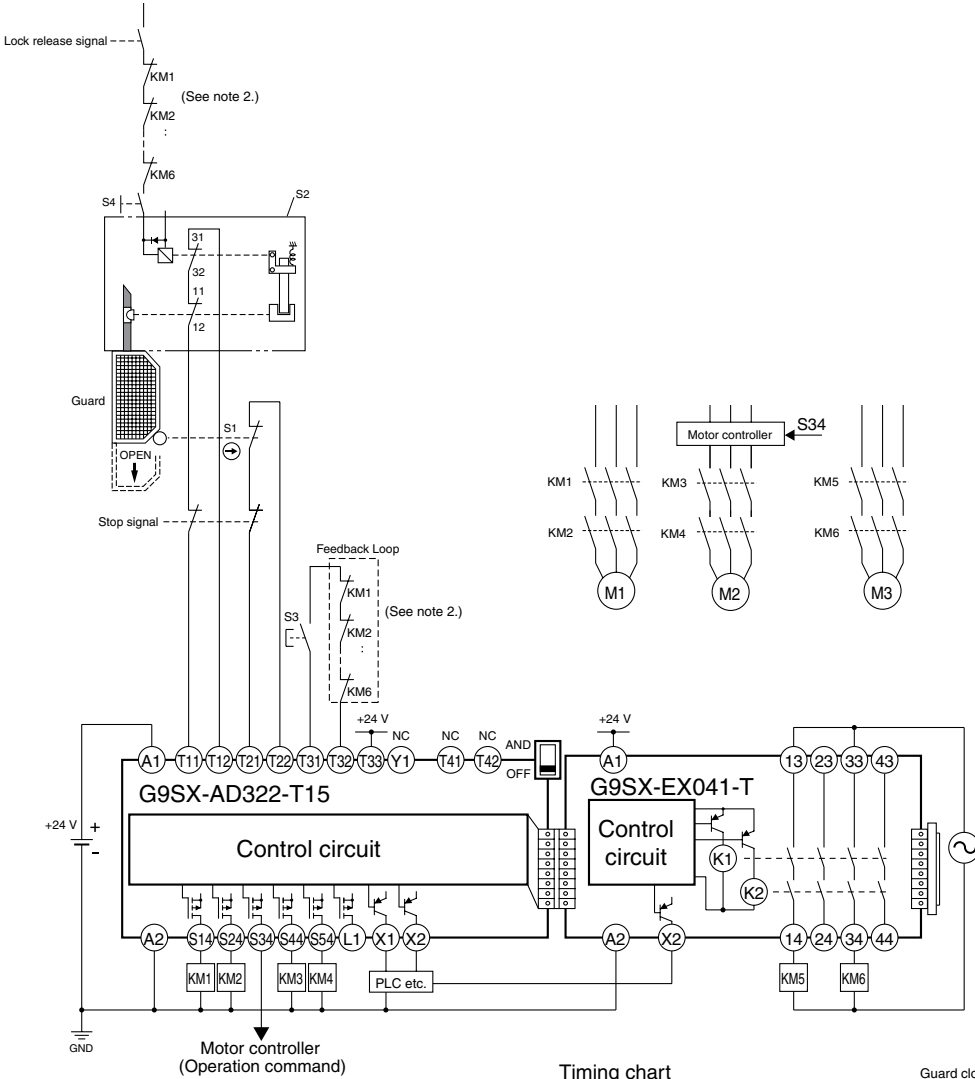
Timing chart
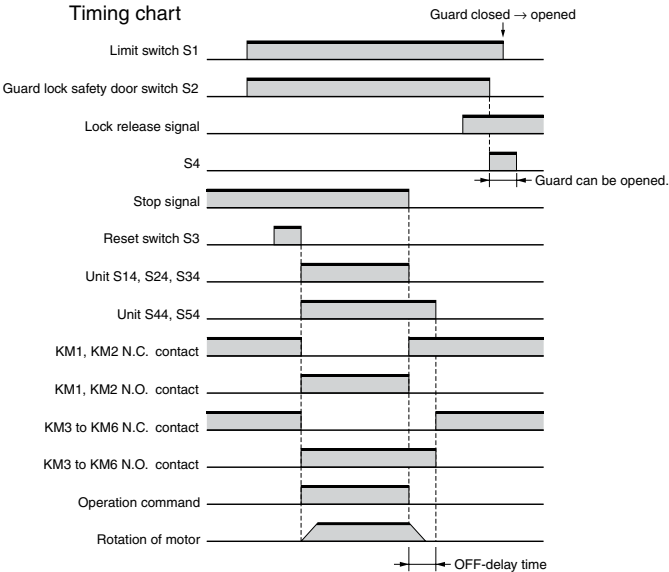
S1: Safety limit switch
S2: Guard lock safety door switch
S3: Reset switch
S4: Lock release switch
KM1 to KM6: Contactor
M1 to M3: 3-phase motor

Notes:
1. This example corresponds to category 4.
2. Connect the N.C. contacts of contactors KM1, KM2, KM3, KM4, KM5, and KM6 in series.

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Applications (continued)

G9SX-BC202 (24 VDC) (2-channel Emergency Stop Switch Input/Manual Reset)
+ **G9SX-AD322-T15** (24 VDC) (2-channel Safety Limit Switch Input/Auto Reset)
+ **G9SX-AD322-T15** (24 VDC) (2-channel Safety Limit Switch Input/Auto Reset)
+ **G9SX-ADA222-T150** (24 VDC) (2-channel Safety Limit Switch Input/Auto Reset)

S1:	Emergency stop switch
S2:	Reset switch
S3, S5, S7:	Safety limit switch
S4, S6, S8:	Limit switch
KM1 to KM8:	Contactor
M1 to M4:	3-phase motor

Note: This example corresponds to category 4.
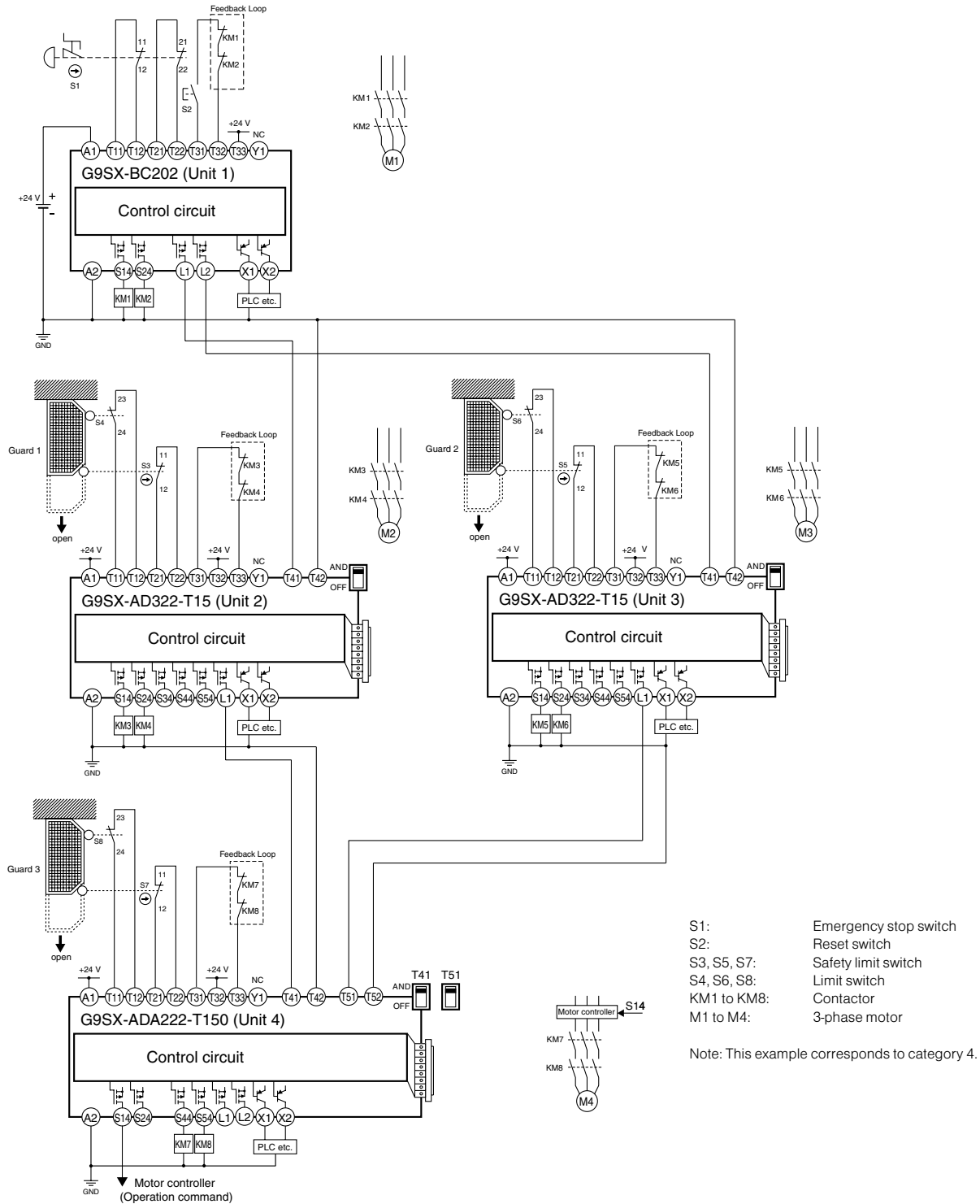
Ordering

Model Number Legend

G9SX – ☐ ☐ ☐ ☐ – ☐ – ☐
    ❶❷❸❹ ❺ ❻

❶ Functions
  AD/ADA: Advanced Unit
  BC: Basic Unit
  EX: Expansion Unit

❷ Output Configuration (Instantaneous Safety Outputs)
  0: None
  2: 2 outputs
  3: 3 outputs
  4: 4 outputs

❸ Output Configuration (OFF-delayed Safety Outputs)
  0: None
  2: 2 outputs
  4: 4 outputs

❹ Output Configuration (Auxiliary Outputs)
  1: 1 output
  2: 2 outputs

❺ Max. OFF-delay Time
  Advanced Unit
    T15: 15 s
    T150: 150 s
  Basic Unit
    No indicator: No OFF delay
  Expansion Unit
    No indicator: No OFF delay
    T: OFF delay

❻ Terminal Block Type
  RT: Screw terminals
  RC: Spring-cage terminals

Note: See List of Models below for the actual models that can be ordered.

List of Models

Advanced Unit

Safety outputs *3		Auxiliary outputs *4	Logical AND connection		No. of input channels	Max. OFF-delay time *1	Rated voltage	Terminal block type	Model
Instant-aneous	OFF-delayed *2		Inputs	Outputs					
3 (Semi-conductor)	2 (Semi-conductor)	2 (Semi-conductor)	1 (Semi-conductor)	1 (Semi-conductor)	1 or 2 channels	15 s	24 VDC	Screw terminals	G9SX-AD322-T15-RT
								Spring-cage terminals	G9SX-AD322-T15-RC
						150 s		Screw terminals	G9SX-AD322-T150-RT
								Spring-cage terminals	G9SX-AD322-T150-RC
2 (Semi-conductor)			2 (Semi-conductor)	2 (Semi-conductor)		15 s		Screw terminals	G9SX-ADA222-T15-RT
								Spring-cage terminals	G9SX-ADA222-T15-RC
						150 s		Screw terminals	G9SX-ADA222-T150-RT
								Spring-cage terminals	G9SX-ADA222-T150-RC

*1. The OFF-delay time can be set in 16 steps as follows:
  T15: 0/0.2/0.3/0.4/0.5/0.6/0.7/1/1.5/2/3/4/5/7/10/15 s
  T150: 0/10/20/30/40/50/60/70/80/90/100/110/120/130/140/150 s
*2. The OFF-delayed output becomes an instantaneous output by setting the OFF-delay time to 0 s.
*3. P channel MOS FET transistor output
*4. PNP transistor output

Basic Unit

Safety outputs *1		Auxiliary outputs *2	No. of input channels	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed					
2	—	2 (Semiconductor)	1 or 2 channels	24 VDC	Screw terminals	G9SX-BC202-RT
					Spring-cage terminals	G9SX-BC202-RC

*1. P channel MOS FET transistor output
*2. PNP transistor output

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Ordering (continued)

Expansion Unit
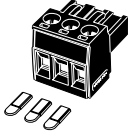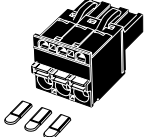
Safety outputs		Auxiliary outputs *1	OFF-delay time	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed					
4 PST-NO	—	1 (Semiconductor)	—	24 VDC	Screw terminals	G9SX-EX401-RT
					Spring-cage terminals	G9SX-EX401-RC
—	4 PST-NO		*2		Screw terminals	G9SX-EX041-T-RT
					Spring-cage terminals	G9SX-EX041-T-RC

*1. PNP transistor output

*2. The OFF-delay time is synchronized to the OFF-delay time setting in the connected Advanced Unit (G9SX-AD-☐/G9SX-ADA-☐).

Accessories
Terminal Block

Appearance *	Specifications	Applicable units	Model	Remarks
	Terminal Block with screw terminals (3-pin)	G9SX-AD-☐ G9SX-ADA-☐	Y9S-03T1B-02A	Two Terminal Blocks (black) with screw terminals, and a set of six code marks to prevent erroneous insertion.
	Terminal Block with screw terminals (4-pin)	G9SX-BC-☐ G9SX-EX-☐	Y9S-04T1B-02A	Two Terminal Blocks (black) with screw terminals, and a set of six code marks to prevent erroneous insertion.
	Terminal Block with spring-cage terminals (3-pin)	G9SX-AD-☐ G9SX-ADA-☐	Y9S-03C1B-02A	Two Terminal Blocks (black) with spring-cage terminals, and a set of six code marks to prevent erroneous insertion.
	Terminal Block with spring-cage terminals (4-pin)	G9SX-BC-☐ G9SX-EX-☐	Y9S-04C1B-02A	Two Terminal Blocks (black) with spring-cage terminals, and a set of six code marks to prevent erroneous insertion.

Note: The G9SX main unit comes with a terminal block as standard equipment. The accessories shown here can be ordered as a replacement.

*The illustrations show 3-pin types

G9SX-GS

Safety Guard Switching Unit

· A safety measure for hazardous operations that does not lower productivity
· Two functions support two types of application:
  − Auto switching: For applications where operators work together with machines
  − Manual switching: For applications with limited operations
· External indicator outputs enable indicating the switching status of two safety input devices.
· Auxiliary outputs enable monitoring of safety inputs, safety outputs, and errors.
· Detailed LED indications enable easy diagnosis.
· Logical AND connection allows complicated applications in combination with other G9SX-series Units.
· Certification for compliance with IEC/EN 61508 (SIL3), IEC/EN 62061 (SIL3), and EN 954-1 (category 4).

Specifications

Ratings

Power Input

	G9SX-GS226-T15-☐	G9SX-EX-☐
Rated supply voltage	24 VDC	
Operating voltage range	-15% to 10% of rated supply voltage	
Rated power consumption*	5 W max.	2 W max.

*Power consumption of loads not included.

Inputs

	G9SX-GS226-T15-☐
Safety inputs	
Mode selector input	Operating voltage: 20.4 VDC to 26.4 VDC Internal impedance: Approx. 2.8 kΩ*
Feedback/reset input	

*Provide a current equal to or higher than that of the minimum applicable load of the connected input control device.

Outputs

	G9SX-GS226-T15-☐
Instantaneous safety outputs *1 OFF-delayed safety outputs *1	P channel MOS FET transistor outputs Load current: 0.8 A DC max. *2
Auxiliary outputs (for input, output and error monitoring)	PNP transistor outputs Load current: 100 mA max.
External indicator outputs	P channel MOS FET transistor outputs Connectable indicators · Incandescent lamp: 24 VDC, 3 to 7 W · LED lamp: 10 to 300 mA DC

*1. While safety standstill detection outputs are in the ON state, the following signal sequence is output continuously for diagnosis. When using these safety outputs as input signals to control devices (i.e. Programmable Controllers), consider the OFF pulse signal shown at right.
*2. The following derating is required when Units are mounted side-by-side. G9SX-GS226-T15-☐: 0.4 A max. load current

Approx. 100 ms

ON
OFF

360 µs max.

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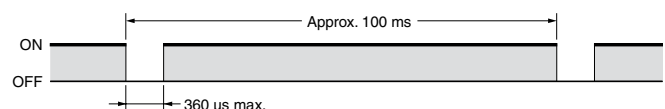
Specifications (continued)

Expansion Unit

	G9SX-EX-□
Rated load	250 VAC, 3 A/30 VDC, 3 A (resistive load)
Rated carry current	3 A
Maximum switching voltage	250 VAC, 125 VDC

Logical AND Connection

	G9SX-GS226-T15-□	G9SX-EX-□
Number of Units connected per logical AND output	4 Units max.	—
Total number of Units connected by logical AND *1	20 Units max.	—
Number of Units connected in series by logical AND	5 Units max.	—
Max. number of Expansion Units connected *2	—	5 Units max.
Maximum cable length for logical AND input	100 m max.	—

Note: See Logical AND Connection Combinations below for details.
*1. The number of G9SX-EX401-□ Expansion Units or G9SX-EX041-T-□ Expansion Units (OFF-delayed Model) not included.
*2. G9SX-EX401-□ Expansion Units and G9SX-EX041-T-□ Expansion Units (OFF-delayed Model) can be mixed.

Wiring

Internal Connection

G9SX-GS226-T15□
(Safety Guard Switching Unit)
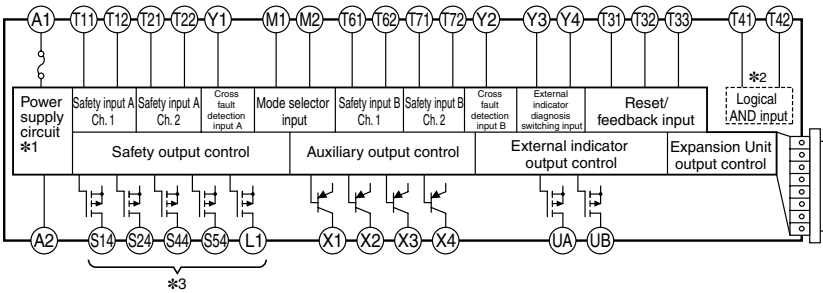
*1. Internal power supply circuit is not isolated.
*2. Logical AND input is isolated.
*3. Outputs S14 to S54 and L1 are internally redundant.

G9SX-EX401-□ / G9SX-EX401-T-□
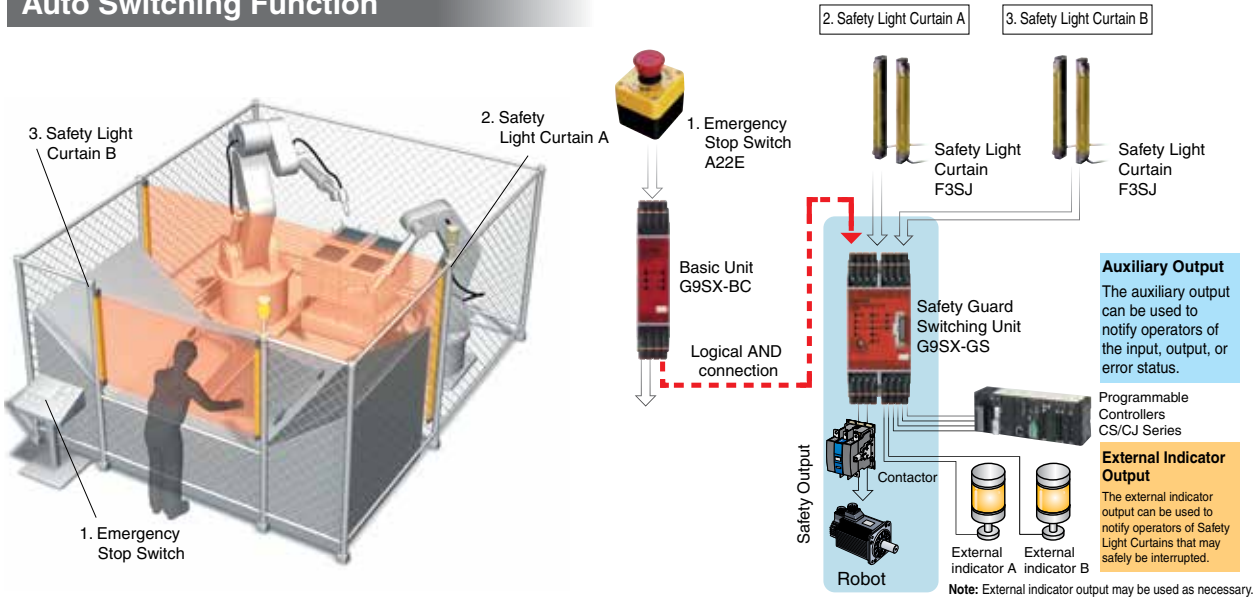**(Expansion Unit/Expansion Unit with OFF Delay)**
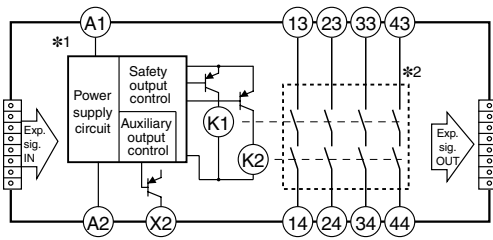
*1. Internal power supply circuit is not isolated.
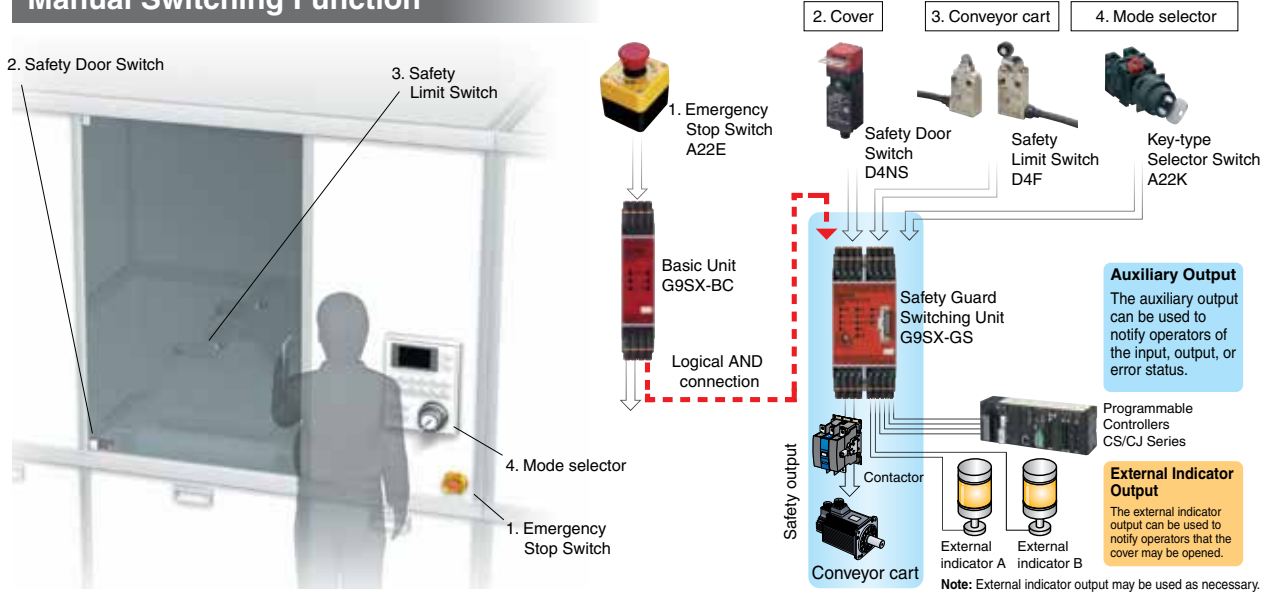*2. Relay outputs are isolated.

System Configuration Examples

Auto Switching Function

Auxiliary Output
The auxiliary output can be used to notify operators of the input, output, or error status.

External Indicator Output
The external indicator output can be used to notify operators of Safety Light Curtains that may safely be interrupted.

Note: External indicator output may be used as necessary.

	Working condition	External indicator	G9SX-GS			
			Safety input	Safety output	Monitor output	External indicator
Normal operation	1	OK to work	Safety input A **ON** / Safety input B **ON**	**ON** Safety output	**ON** Input A monitor / **ON** Input B monitor	Indicator A (on) / Indicator B (on)
	2	OK to work	Safety input A **ON** / Safety input B **OFF**	**ON** Safety output	**ON** Input A monitor / **OFF** Input B monitor	Indicator A (off) / Indicator B (on)
	3	Not OK to work	Safety input A **OFF** / Safety input B **ON**	**ON** Safety output	**OFF** Input A monitor / **ON** Input B monitor	Indicator A (on) / Indicator B (off)
Hazardous condition	4	Not OK to work	Safety input A **OFF** / Safety input B **OFF**	**OFF** Safety output	**OFF** Input A monitor / **OFF** Input B monitor	Indicator A (off) / Indicator B (off)

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System Configuration Examples (continued)

Manual Switching Function

2. Safety Door Switch
3. Safety Limit Switch
4. Mode selector
1. Emergency Stop Switch

2. Cover
3. Conveyor cart
4. Mode selector

1. Emergency Stop Switch A22E

Safety Door Switch D4NS
Safety Limit Switch D4F
Key-type Selector Switch A22K

Basic Unit G9SX-BC

Logical AND connection

Safety Guard Switching Unit G9SX-GS

Safety output

Contactor

Conveyor cart

Auxiliary Output
The auxiliary output can be used to notify operators of the input, output, or error status.

Programmable Controllers CS/CJ Series

External Indicator Output
The external indicator output can be used to notify operators that the cover may be opened.

External indicator A
External indicator B

Note: External indicator output may be used as necessary.

Working condition		External indicator	G9SX-GS				
			Safety input	Safety output	Mode selector	Monitor output	External indicator
Normal operation	1	Not OK to open	Safety input A: **Disabled** / Safety input B: **ON**	**ON** Safety output	Normal operating mode	Input A monitor: OFF / Input B monitor: ON	Indicator A / Indicator B
Maintenance	2	OK to open	Safety input A: **ON** / Safety input B: **Disabled**	**ON** Safety output	Maintenance mode	Input A monitor: ON / Input B monitor: OFF	Indicator A / Indicator B
Maintenance	3	OK to open	Safety input A: **ON** / Safety input B: **Disabled**	**ON** Safety output	Maintenance mode	Input A monitor: ON / Input B monitor: OFF	Indicator A / Indicator B
Hazardous condition	4	OK to open	Safety input A: **OFF** / Safety input B: **Disabled**	**OFF** Safety output	Maintenance mode	Input A monitor: OFF / Input B monitor: OFF	Indicator A / Indicator B

Functions

Auto Switching Function

The following table shows the relationship between the safety inputs and safety outputs of the G9SX-GS☐ when auto switching is selected.

Safety input A	ON	ON	OFF	OFF
Safety input B	ON	OFF	ON	OFF
Safety output	ON	ON	ON	OFF

Notes:
1. If the logical AND connection input is enabled, it must be ON as a necessary condition for the above table.
2. Select either auto reset or manual reset for the reset mode, depending on the operation of the application.

Manual Switching Function

As shown in the following table, the relationship between the safety inputs and safety outputs of the G9SX-GS☐ depends on the setting of the connected mode selector when manual switching is selected.

Mode Selector = Normal Operating Mode (M1 = ON, M2 = OFF)

Safety input A	ON	ON	OFF	OFF
Safety input B	ON	OFF	ON	OFF
Safety output	ON	OFF	ON	OFF

Mode Selector = Maintenance Mode (M1 = OFF, M2 = ON)

Safety input A	ON	ON	OFF	OFF
Safety input B	ON	OFF	ON	OFF
Safety output	ON	ON	OFF	OFF

Notes:
1. If the logical AND connection input is enabled, it must be ON as a necessary condition for the above table.
2. Select either auto reset or manual reset for the reset mode, depending on the operation of the application.

Logical AND Connection

The logical AND connection means that one Unit (Unit A) outputs a safety signal "a" to a subsequent Unit (Unit B) and Unit B calculates the logical AND between safety signal "a" and safety signal "b." In the example shown below, the logical AND connection results in a safety output of "a AND b" for Unit B
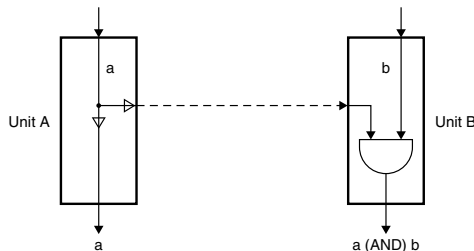
Note: For details on the logical AND connection, refer to the G9SX-series Flexible Safety Unit catalog (Cat. No. J150).

External Indicator Outputs

The operator can be notified of two safety input states (enabled/disabled) by connecting external indicator outputs UA and UB to indicators. External indicator outputs UA and UB turn ON when safety inputs A and B, respectively, are disabled, and turn OFF when safety inputs A and B, respectively, are enabled.
If error monitor output X2 turns ON, UA and UB will both turn OFF.

Auto Switching Selected

External indicator output	Description of operation	Output ON condition
UA	Safety input A is disabled.	Safety input B is ON.
UB	Safety input B is disabled.	Safety input A is ON.

Manual Switching Selected

External indicator output	Description of operation	Output ON condition
UA	Safety input A is disabled.	Mode selector switch must be set to normal operating mode.
UB	Safety input B is disabled.	Mode selector switch must be set to maintenance mode.

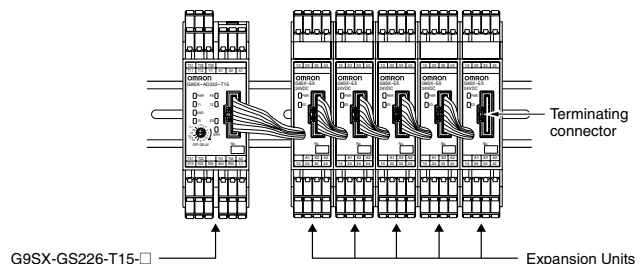Note: Fault of external indicators can be detected.

Auxiliary Outputs

Auxiliary outputs X1 to X4 can be used to notify the operator of input, output, and error states, as shown in the following table.

Terminal name	Signal name	Output ON condition
X1	Auxiliary monitor output	X1 is ON when the instantaneous safety output is ON.
X2	Auxiliary error output	X2 is ON when the error LED is lit or flashing.
X3	Input A monitor	X3 is ON when safety input A is ON.
X4	Input B monitor	X4 is ON when safety input B is ON.

Connecting Expansion Units

- The G9SX-EX and G9SX-EX-T Expansion Units can be connected to the G9SX-GS226-T15-☐ to increase the number of safety outputs.
- A maximum of five Expansion Units can be connected to one G9SX-GS226-T15-☐. This may be a combination of the G9SX-EX Instantaneous Expansion Unit and the G9SX-EX-T OFF-delayed Expansion Unit.
- Remove the terminating connector from the receptacle on the G9SX-GS226-T15-☐ and insert the Expansion Unit cable connector into the receptacle. Insert the terminating connector into the receptacle on the Expansion Unit at the very end (rightmost).
- When Expansion Units are connected to the G9SX-GS226-T15-☐, make sure that power is supplied to every Expansion Unit. (Refer to the following diagram for actual Expansion Unit connections.)
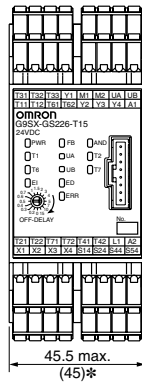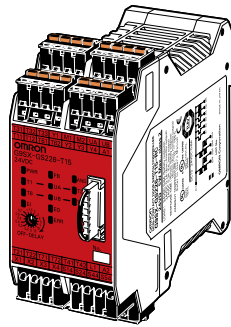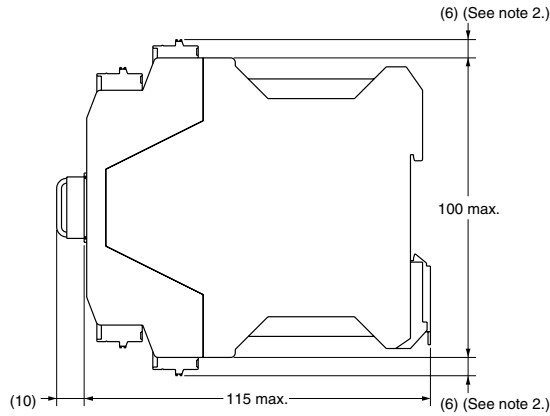
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Dimensions and Terminal Arrangements
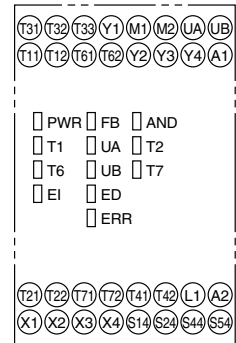
(mm)

Safety Guard Switching Unit

G9SX-GS226-T15-□

Terminal arrangement

(6) (See note 2.)

100 max.

45.5 max.
(45)✻

(10)   115 max.   (6) (See note 2.)

✻ Typical dimension

Notes:
1. Above outline drawing is for -RC terminal type.
2. For -RC terminal type only.

T31 T32 T33 Y1 M1 M2 UA UB
T11 T12 T61 T62 Y2 Y3 Y4 A1

☐ PWR ☐ FB ☐ AND
☐ T1   ☐ UA ☐ T2
☐ T6   ☐ UB ☐ T7
☐ EI   ☐ ED
       ☐ ERR

T21 T22 T71 T72 T41 T42 L1 A2
X1 X2 X3 X4 S14 S24 S44 S54

Expansion Unit

G9SX-EX401-□

Expansion Unit (OFF-delayed Model)

G9SX-EX041-T-□

(6) (See note 2.)

100 max.

23 max.
(22.5)✻

115 max.   (6) (See note 2.)

✻ Typical dimension

Notes:
1. Above outline drawing is for -RC terminal type.
2. For -RC terminal type only.

Terminal arrangement

G9SX-EX401-□
(Expansion Unit)

13 23 33 43

☐ PWR
☐ EI
☐ ERR

A1 X2 A2
14 24 34 44

G9SX-EX041-T-□
(Expansion Unit
with OFF Delay)

13 23 33 43

☐ PWR
☐ ED
☐ ERR

A1 X2 A2
14 24 34 44

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Application Examples

G9SX-BC202 (24 VDC) (Guard Lock Safety Door Switch (Mechanical Lock),
(2-channel Emergency Stop Switch Input/Manual Reset)

+ G9SX-GS226-T15 (24 VDC) (Two 2-channel Safety Sensor Inputs/Auto Reset/Auto Switching)

Notes:
1. This example corresponds to category 4.
   For details, refer to Safety Categories (EN 954-1).
2. Diagnostic checks of the external indicators connected to
   external indicator outputs UA and UB can be switched with
   Y3 and Y4, respectively.
3. Use safety sensors with PNP outputs.

Application Examples

Safety Sensor 1
Safety Sensor 2
Emergency Stop Switch

S1: Emergency stop switch
S2: Reset switch
KM1 to KM4: Contactors
M1 and M2: 3-phase motors

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Application Examples (continued)

G9SX-BC202 (24 VDC) (2-channel Emergency Stop Switch Input/Manual Reset),

+ G9SX-GS226-T15 (24 VDC) (Safety Limit Switch, 2-channel Safety Door Switch Inputs/Manual Reset/Manual Switching)

Notes:
1. This example corresponds to category 4.
   For details, refer to Safety Categories (EN 954-1).
2. Diagnostic checks for the external indicators connected to external
   indicator outputs UA and UB can be switched with Y3 and Y4, respectively.

Application Examples

S1: Emergency Stop Switch
S2, S7: Reset Switches
S3, S4: Safety Limit Switches
S5: Safety Door Switch
S6: Selector Switch
KM1 to KM4: Contactors
M1 and M2: 3-phase motors

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Application Examples (continued)

G9SX-BC2O2 (24 VDC) (2-channel Emergency Stop Switch Input/Manual Reset),
+ G9SX-GS226-T15 (24 VDC) (Safety Limit Switch, 2-channel Safety Door Switch Inputs/Manual Reset/Manual Switching),
+ G9SX-AD322-T15 (24 VDC) (2-channel Safety Door Switch Input/Manual Reset)

Notes:
1. This example corresponds to category 4.
   For details, refer to Safety Categories (EN 954-1).
2. Diagnostic checks for the external indicators connected to external indicator outputs UA and UB can be switched with Y3 and Y4, respectively.

Application Examples

S1: Emergency Stop Switch
S2, S7, S9: Reset Switches
S3, S4: Safety Limit Switches
S5, S8: Safety Door Switches
S6: Selector Switch
KM1 to KM6: Contactors
M1 to M3: 3-phase motors

Ordering

Model Number Legend

G9SX – ☐ ☐ ☐ ☐ – ☐ – ☐
    ❶❷❸❹ ❺ ❻

❶ Functions
  GS: Safety Guard Switching Unit
  EX: Expansion Unit

❷ Output Configuration (Instantaneous Safety Outputs)
  0: None
  2: 2 outputs
  4: 4 outputs

❸ Output Configuration (OFF-delayed Safety Outputs)
  0: None
  2: 2 outputs
  4: 4 outputs

❹ Output Configuration (Auxiliary Outputs)
  1: 1 output
  6: 6 outputs

❺ Max. OFF-delay Time
  Safety Guard Switching Unit
    T15: 15 s
  Expansion Unit
    No indicator: No OFF delay
    T: OFF delay

❻ Terminal Block Type
  RT: Screw terminals
  RC: Spring-cage terminals

Note: See List of Models below for the actual models that can be ordered.

List of Models

Safety Guard Switching Unit

Safety outputs *3		Auxiliary outputs *4	Logical AND connection		Max. OFF-delay time *1	Rated voltage	Terminal block type	Model
Instant-aneous	OFF-delayed *2		Inputs	Outputs				
2 (Semi-conductor)	2 (Semi-conductor)	6 (Semi-conductor)	1 (Semi-conductor)	1 (Semi-conductor)	15 s	24 VDC	Screw terminals	G9SX-GS226-T15-RT
							Spring-cage terminals	G9SX-GS226-T15-RC

*1. The OFF-delay time can be set in 16 steps as follows:
  T15: 0/0.2/0.3/0.4/0.5/0.6/0.7/1/1.5/2/3/4/5/7/10/15 s
*2. The OFF-delayed output becomes an instantaneous output by setting the OFF-delay time to 0 s.
*3. P channel MOS FET transistor output
*4. PNP transistor output (except for the external indicator outputs, which are P channel MOS FET transistor outputs)

Expansion Unit

Safety outputs		Auxiliary outputs *1	OFF-delay time	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed					
4 PST-NO	—	1 (Semiconductor)	—	24 VDC	Screw terminals	G9SX-EX401-RT
					Spring-cage terminals	G9SX-EX401-RC
—	4 PST-NO		*2		Screw terminals	G9SX-EX041-T-RT
					Spring-cage terminals	G9SX-EX041-T-RC

*1. PNP transistor output
*2. The OFF-delay time is synchronized to the OFF-delay time setting in the connected Unit (G9SX-GS226-T15-☐).

G9SX-SM

Standstill Monitoring Unit

- Sensor-less monitoring of standstill for machines with long inertia
- Standstill is monitored by the motor's back electromotive force (BEMF) signal
- Features a "Standard Configuration", allowing immediate use without sensitivity adjustment
- "User Configuration" also available for fine-tuning of sensitivity
- Detailed LED indications enable easy fault diagnosis
- Safety Category 4 (EN954-1), PLe(ISO13849-1), SIL 3 (IEC/EN 62061) certified

Specifications

Ratings

Power Input

	G9SX-SM032-□
Rated supply voltage	24 VDC
Operating voltage range	-15% to 10% of rated supply voltage
Rated power consumption*	4 W max.

*Power consumption of loads not included.

Inputs

	G9SX-SM032-□
Rated input voltage	Standstill detection input (between Z1 and Z2 and between Z3 and Z4)*1 480 VAC max. (120 Hz max.) *2 Will not accept DC voltage input.
Internal impedance	Standstill detection input: Approx. 660 kΩ*3 EDM input: Approx. 2.8 kΩ*3

*1. Input the motor phase-to-phase voltage between Z1 and Z2 and between Z3 and Z4.
*2. When a motor with AC240V or more is used, connect neutral point of the power supply to earth.
*3. Use a contact that is applicable to microloads (24 VDC, 5 mA) for connection to the EDM input.

Outputs

	G9SX-SM032-□
Safety standstill detection output *1	Source output (PNP), load current: 0.3 A DC max.*2
Auxiliary output (output monitor/error)	Source output (PNP), load current: 100 mA max.

*1. While safety standstill detection outputs are in the ON state, the following pulse signal is output continuously for output circuit diagnosis. When using the safety standstill detection outputs as input signals to control devices (i.e. Programmable Controllers), consider the pulse signal shown below.

ON
OFF
Approx. 100 ms
360 μs max.
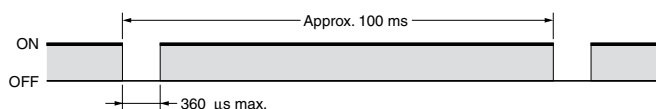
*2. The following derating is required when Units are mounted side-by-side.
G9SX-SM032-□: 0.2 A max. load current

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G7SA

Compact, Slim Relays Conforming to EN Standards

- Relays with forcibly guided contacts (EN50205 Class A, certified by VDE)
- Supports the CE marking of machinery (Machinery Directive)
- Helps avoid hazardous machine status when used as part of an interlocking circuit
- Four-pole and six-pole Relays are available
- The relay's terminal arrangement simplifies PWB pattern design
- Reinforced insulation between inputs and outputs. Reinforced insulation between some poles of different polarity.

Specifications

Ratings

Coil

Rated Voltage	Rated Current (mA)	Coil Resistance (Ω)	Must Operate Voltage (V)	Must Release Voltage (V)	Max. Voltage (V)	Power Consumption (mW)
24 VDC	4 poles: 15 6 poles: 20.8	4 poles: 1,600 6 poles: 1,152	75% max.	10% min.	110%	4 poles: Approx. 360 6 poles: Approx. 500

Notes:
1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±15%.
2. Performance characteristics are based on a coil temperature of 23°C.
3. The maximum voltage is based on an ambient operating temperature of 23°C maximum.

Contacts

	Resistive Load
Rated load	6 A at 250 VAC, 6 A at 30 VDC
Rated carry current	6 A
Max. switching voltage	250 VAC, 125 VDC
Max. switching current	6 A
Max. drop-out time*	10 ms

*The drop-out time is the time it takes for the N/O contacts to open after the coil voltage is turned OFF.

Certified Standards

- EN Standards, VDE Certified
  EN61810-1 (Electromechanical non-specified time all-or-nothing relays)
  EN50205 (Relays with forcibly guided (linked) contacts)
- UL standard UL508 Industrial Control Devices
- CSA standard CSA C22.2 No. 14 Industrial Control Devices

Forcibly-Guided Contacts (from EN50205)

If an NO contact becomes welded, all NC contacts will maintain a minimum distance of 0.5 mm when the coil is not energized. Likewise if an NC contact becomes welded, all NO contacts will maintain a minimum distance of 0.5 mm when the coil is energized.

Characteristics of Sockets

Model	Continuous Current	Dielectric Strength	Insulation Resistance
P7SA-1□	6 A *1	2,500 VAC for 1 min. between poles	1,000 MΩ min. *2

Notes:
Use the P7SA-1□F-ND in the ambient temperature range of -20 to 70°C.
  Use the P7SA-1□F and P7SA-1□F-ND in the ambient humidity range of 45 to 85%.
*1. When operating the P7SA-1□F at a temperature between 55 and 85°C, reduce the continuous current (6 A at 55°C or less) by 0.1 A for each degree above 55°C.
  When operating the P7SA-1□F-ND at a temperature between 50 and 70°C, reduce the continuous current (6 A at 50°C or less) by 0.3 A for each degree above 50°C.
*2. Measurement conditions: Measurement of the same points as for the dielectric strength at 500 VDC.

Specifications (continued)

Contact resistance *1		100 mΩ max.
Operating time *2		20 ms max.
Response time *3		10 ms max.
Release time *2		20 ms max.
Must operate voltage		75% max.
Must release voltage		10% min.
Maximum operating frequency	Mechanical	36,000 operation/h
	Rated load	1,800 operation/h
Insulation resistance *4		1,000 MΩ min.
Dielectric strength *5 *6		Between coil contacts/different poles (except for poles 3-4 in 4-pole relays and poles 3-5, 4-6, and 5-6 in 6-pole relays): 4,000 VAC, 50/60 Hz for 1 min. Between different poles (poles 3-4 in 4-pole relays and poles 3-5, 4-6, and 5-6 in 6-pole relays): 2,500 VAC, 50/60 Hz for 1 min. Between contacts of same polarity: 1,500 VAC, 50/60 Hz for 1 min.
Vibration resistance		10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)
Shock resistance	Destruction	1,000 m/s^2
	Malfunction	100 m/s^2
Durability *7	Mechanical	10,000,000 operations min. (at approx. 36,000 operations/h)
	Electrical	100,000 operations min. (at the rated load and approx. 1,800 operations/h)
Inductive load switching capability *8 (IEC60947-5-1)		AC15 AC250V 2A DC13 DC24V 1A
Failure rate (P level) (reference value *9)		5 VDC, 1 mA
Ambient operating temperature *10		12 to 48 VDC: -40 to 85°C (with no icing or condensation)
Ambient operating humidity		5% to 85%
Weight		4 poles: Approx. 22 g 6 poles: Approx. 25 g

Specifications are subject to change without notice.

Notes: 1. The above values are initial values.
      2. Performance characteristics are based on coil temperature of 23°C.
*1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.
*2. These times were measured at the rated voltage and an ambient temperature of 23°C. Contact bounce time is not included.
*3. The response time is the time it takes for the normally open contacts to open after the coil voltage is turned OFF. Contact bounce time is included. Measurement conditions: Rated voltage operation, Ambient temperature: 23°C.
*4. The insulation resistance was measured with a 500 VDC megohmmeter at the same locations as the dielectric strength was measured.
*5. Pole 3 refers to terminals 31-32 or 33-34, pole 4 refers to terminals 43-44, pole 5 refers to terminals 53-54, and pole 6 refers to terminals 63-64.
*6. When using a P7SA Socket, the dielectric strength between coil contacts/different poles is 2,500 VAC, 50/60 Hz for 1 min.
*7 The durability is for an ambient temperature of 15 to 35°C and an ambient humidity of 25% to 75%. For the durability performance to the load refer to the Durability Curve.
*8. AC15: cosø = 0.3, DC14: L/R = 48 ms.
*9. The failure rate is based on an operating frequency of 300 operations/min.
*10. 12 to 48 VDC: When operating between 70 to 85°C, reduce the rated current of 6 A by 0.1 A for each degree above 70°C.

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Engineering Data

Durability Curve
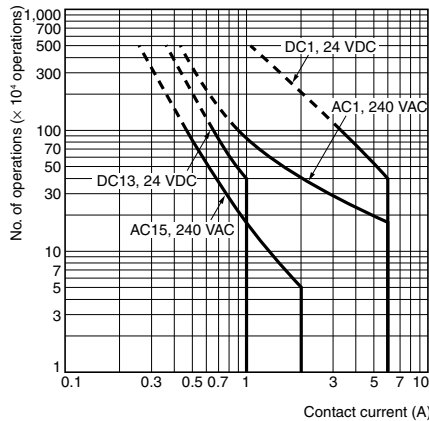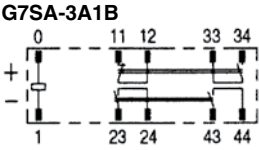

Dimensions   (mm)

G7SA-3A1B
G7SA-2A2B
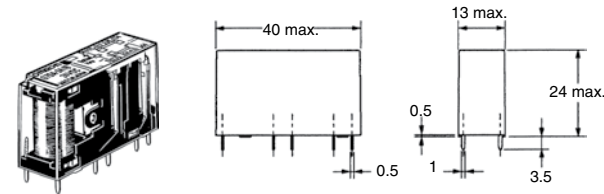
**Terminal Arrangement/
Internal Connection Diagram
(Bottom View)**

G7SA-3A1B

G7SA-2A2B

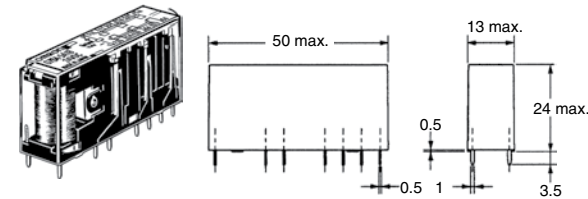**Printed Circuit Board
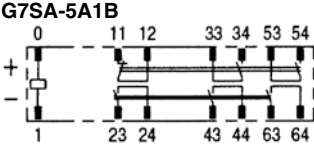Design Diagram
(Bottom View)**
(±0.1 tolerance)
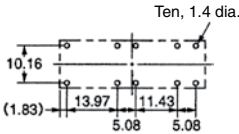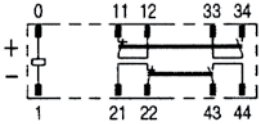
Notes:
1. Terminals 23-24, 33-34, and
43-44 are normally open. Terminals
11-12 and 21-22 are normally
closed.
2. The colors of the cards inside
the Relays are as follows: G7SA-
3A1B: Blue and G7SA-2A2B: White.

G7SA-5A1B
G7SA-4A2B
G7SA-3A3B

**Terminal Arrangement/
Internal Connection Diagram
(Bottom View)**

G7SA-5A1B

G7SA-4A2B

G7SA-3A3B

**Printed Circuit Board
Design Diagram
(Bottom View)**
(±0.1 tolerance)
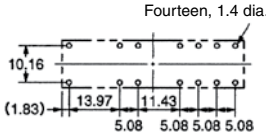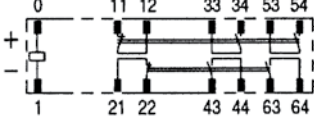
Notes:
1. Terminals 23-24, 33-34, 43-44,
53-54, and 63-64 are normally
open. Terminals 11-12, 21-22, and
31-32 are normally closed.
2. The colors of the cards inside
the Relays are as follows: G7SA-
5A1B: Blue, G7SA-4A2B: White,
and G7SA-3A3B: Yellow.

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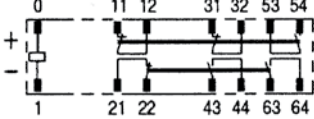
Dimensions (continued)

(mm)

Track-mounting Socket
P7SA-10F, P7SA-10F-ND
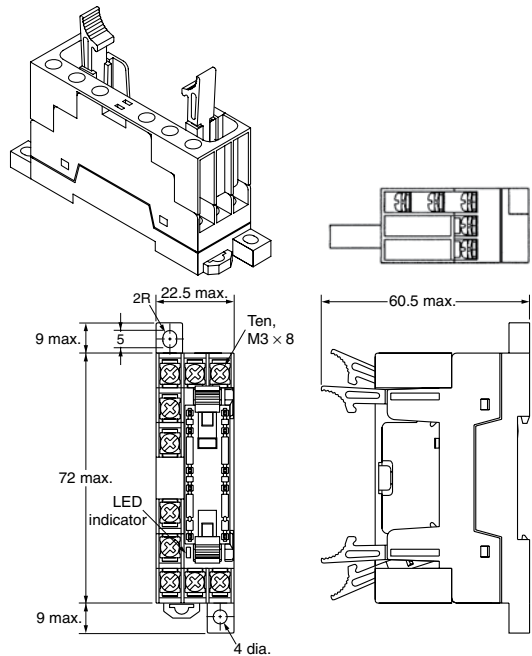
Terminal Arrangement/Internal Connection Diagram (Top View)

G7SA-3A1B Mounted
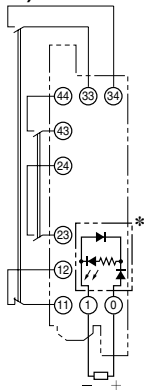
G7SA-2A2B Mounted
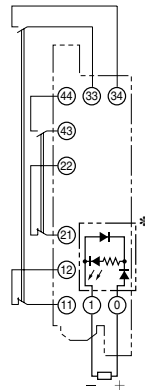
✻ This display circuit is available only for "-ND" models.

Note: Terminals 23-24, 33-34, and 43-44 are normally open. Terminals 11-12 and 21-22 are normally closed.
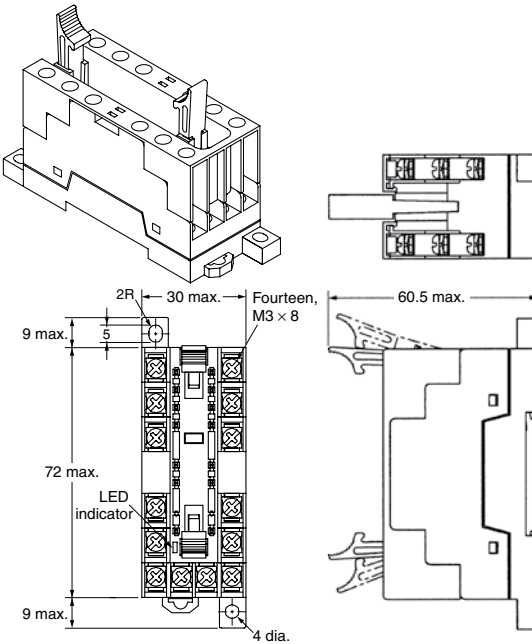
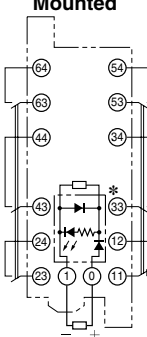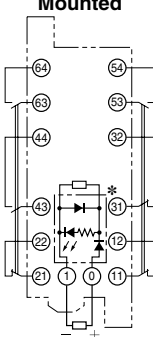**Mounting Hole Placement Diagram (Top View)**

Two, 4 dia. or M3.5

14.5±0.2

80±0.2

Note 1: The socket is shown with the finger cover removed.
2: Only the -ND Sockets have LED indicators (orange)

Track-mounting Socket
P7SA-14F, P7SA-14F-ND

Terminal Arrangement/Internal Connection Diagram (Top View)

G7SA-5A1B Mounted

G7SA-4A2B Mounted

G7SA-3A3B Mounted

Mounting Hole Placement Diagram (Top View)

Two, 4 dia. or M3.5

22±0.2

80±0.2

✻ This display circuit is available only for "-ND" models.

Note: Terminals 23-24, 33-34, 43-44, 53-54, and 63-64 are normally open. Terminals 11-12, 21-22, and 31-32 are normally closed.

Note 1: The socket is shown with the finger cover removed.
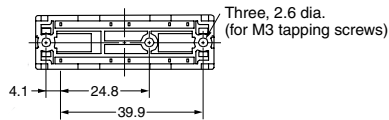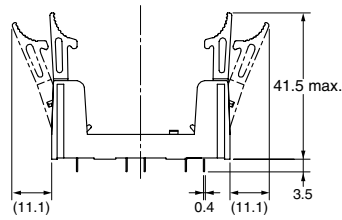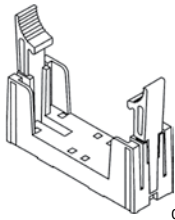**2:** Only the -ND Sockets have LED indicators (orange).

Dimensions (continued)
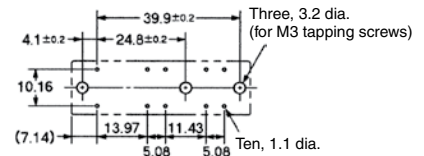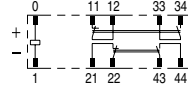
(mm)

Back-mounting Socket (for PCB)
P7SA-10P

0.5 — 50 max. — 0.5

15 max.

41.5 max.

(11.1) 0.4 (11.1) 3.5

0.8

Three, 2.6 dia.
(for M3 tapping screws)

4.1 24.8 39.9

Terminal Arrangement/Internal Connection Diagram (Bottom View)

G7SA-3A1B Mounted

0   11 12   33 34

+

1   23 24   43 44

G7SA-2A2B Mounted

0   11 12   33 34

+

1   21 22   43 44

Mounting Hole Placement (Bottom View)
(±0.1 tolerance)

39.9±0.2   Three, 3.2 dia.
(for M3 tapping screws)

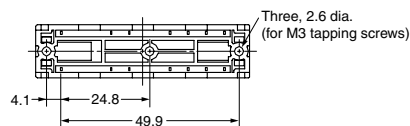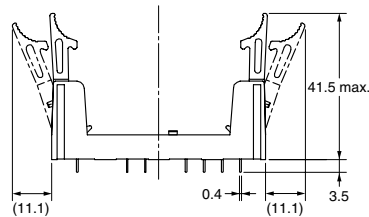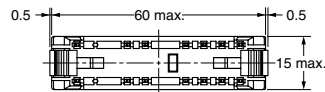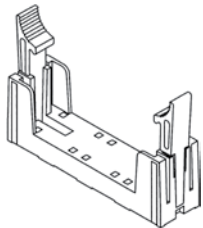4.1±0.2   24.8±0.2

10.16

(7.14)   13.97   11.43   Ten, 1.1 dia.
5.08   5.08

Note: Terminals 23-24, 33-34, and 43-44 are normally open. Terminals 11-12 and 21-22 are normally closed.
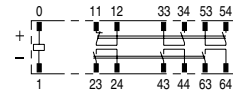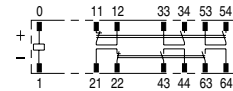
Back-mounting Socket (for PCB)
P7SA-14P

0.5 — 60 max. — 0.5

15 max.

41.5 max.

(11.1) 0.4 (11.1) 3.5

0.8

Three, 2.6 dia.
(for M3 tapping screws)

4.1 24.8 49.9

Terminal Arrangement/Internal Connection Diagram (Bottom View)

G7SA-5A1B Mounted

0   11 12   33 34   53 54

+

1   23 24   43 44   63 64

G7SA-4A2B Mounted

0   11 12   33 34   53 54

+

1   21 22   43 44   63 64

G7SA-3A3B Mounted

0   11 12   31 32   53 54

+

1   21 22   43 44   63 64

Mounting Hole Placement (Bottom View)
(±0.1 tolerance)

49.9±0.2   Three, 3.2 dia.
(for M3 tapping screws)

4.1±0.2   24.8±0.2   Fourteen, 1.1 dia.

10.16

(7.14)   13.97   11.43
5.08   5.08 5.08 5.08

Note: Terminals 23-24, 33-34, 43-44, 53-54, and 63-64 are normally open. Terminals 11-12, 21-22, and 31-32 are normally closed.

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I-53

Ordering

Model Number Legend

G7SA – ☐ A ☐ B
    ❶   ❷

❶ NO Contact Poles
  2: DPST-NO
  3: 3PST-NO
  4: 4PST-NO
  5: 5PST-NO

❷ NC Contact Poles
  1: SPST-NC
  2: DPST-NC
  3: 3PST-NC

Relays with Forcibly Guided Contacts

Type	Sealing	Poles	Contact Configuration	Rated Voltage*	Model
Standard	Flux-tight	4 poles	3PST-NO, SPST-NC	24 VDC	G7SA-3A1B DC24
			DPST-NO, DPST-NC		G7SA-2A2B DC24
		6 poles	5PST-NO, SPST-NC		G7SA-5A1B DC24
			4PST-NO, DPST-NC		G7SA-4A2B DC24
			3PST-NO, 3PST-NC		G7SA-3A3B DC24

*Consult your Omron representative for details on rated voltages of 12 VDC, 18 VDC, 21 VDC and 48 VDC.

Sockets

Type		LED Indicator	Poles	Rated Voltage	Model
Track-mounting	Track mounting and screw mounting possible	No	4 poles	–	P7SA-10F
			6 poles		P7SA-14F
		Yes	4 poles	24 VDC	P7SA-10F-ND DC24
			6 poles		P7SA-14F-ND DC24
Back-mounting	PCB terminals	No	4 poles	–	P7SA-10P
			6 poles		P7SA-14P

Relays with Forcibly Guided Contacts and Track Mounting Sockets (assemblies)

Relay Specifications			Socket Specifications			
Poles	Contact Configuration	Rated Coil Voltage	Type	LED Indicator	LED Rated Voltage	Assembly Model
4 poles	DPST-NO, DPST-NC	24 VDC	Track Mounting and screw mounting possible	No		FGRMS22-24
4 poles	3PST-NO, SPST-NC	24 VDC	Track Mounting and screw mounting possible	No		FGRMS31-24
6 poles	3PST-NO, 3PST-NC	24 VDC	Track Mounting and screw mounting possible	No		FGRMS33-24
6 poles	4PST-NO, 2PST-NC	24 VDC	Track Mounting and screw mounting possible	No		FGRMS42-24
6 poles	5PST-NO, SPST-NC	24 VDC	Track Mounting and screw mounting possible	No		FGRMS51-24
4 poles	DPST-NO, DPST-NC	24 VDC	Track Mounting and screw mounting possible	Yes	24 VDC	FGRMS22-24-LED
4 poles	3PST-NO, SPST-NC	24 VDC	Track Mounting and screw mounting possible	Yes	24 VDC	FGRMS31-24-LED
6 poles	3PST-NO, 3PST-NC	24 VDC	Track Mounting and screw mounting possible	Yes	24 VDC	FGRMS33-24-LED
6 poles	4PST-NO, 2PST-NC	24 VDC	Track Mounting and screw mounting possible	Yes	24 VDC	FGRMS42-24-LED
6 poles	5PST-NO, SPST-NC	24 VDC	Track Mounting and screw mounting possible	Yes	24 VDC	FGRMS51-24-LED

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Lineup Now Includes 10 A Models

· Relays with forcibly guided contacts (EN50205 Class A, certified by VDE).
· Supports the CE marking of machinery (Machinery Directive).
· Helps avoid hazardous machine status when used as part of an interlocking circuit.
· Track-mounting and Back-mounting Sockets are available.
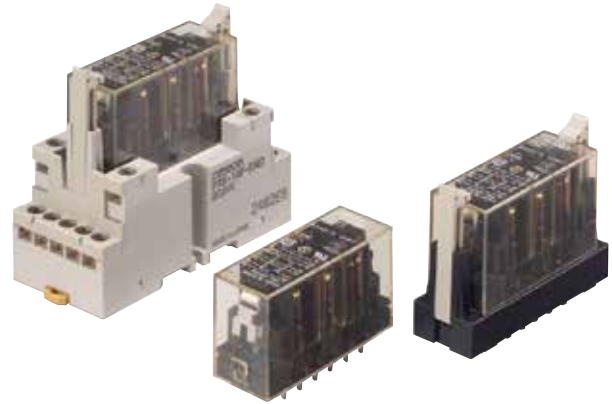
Specifications

Ratings

Coil

Rated Voltage	Rated Current (mA)	Coil Resistance (Ω)	Must Operate Voltage (V)	Must Release Voltage (V)	Max. Voltage (V)	Power Consumption (W)
24 VDC	30	800	80% max.	10% min.	110%	Approx. 0.8

Notes:
1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±15%.
2. Performance characteristics are based on a coil temperature of 23°C.
3. The maximum voltage is based on an ambient operating temperature of 23°C maximum.

Contacts

		Resistive load	Inductive load *
Rated load	NO contact	10 A at 250 VAC 10 A at 30 VDC	AC-15: 5 A at 240 VAC DC-13: 2 A at 24 VDC
	NC contact	6 A at 250 VAC 6 A at 30 VDC	AC-15: 3 A at 240 VAC DC-13: 2 A at 24 VDC
Rated carry current	NO contact	10 A	
	NC contact	6 A	
Maximum switching voltage		250 VAC, 30 VDC	
Maximum switching current	NO contact	10 A	
	NC contact	6 A	

*In the above table, cosø = 0.3 for AC-15 inductive loads and L/R = 96 ms for DC-13 inductive loads.

Certified Standards

· EN Standards, VDE Certified
  EN61810-1 (Electromechanical non-specified time all-or-nothing relays)
  EN60255-23 (Contact performance)
  EN50205 (Relays with forcibly guided (linked) contacts)
· UL standard UL508 Industrial Control Devices
· CSA standard CSA C22.2 No. 14 (Industrial Control Equipment)

Forcibly-Guided Contacts (from EN50205)

If an NO contact becomes welded, all NC contacts will maintain a minimum distance of 0.5 mm when the coil is not energized. Likewise if an NC contact becomes welded, all NO contacts will maintain a minimum distance of 0.5 mm when the coil is energized.

Characteristics of Sockets

Model	Continuous Current	Dielectric Strength	Insulation Resistance
P7S-14☐	10 A	2,000 VAC for 1 min. between poles	1,000 MΩ min. *

Notes:
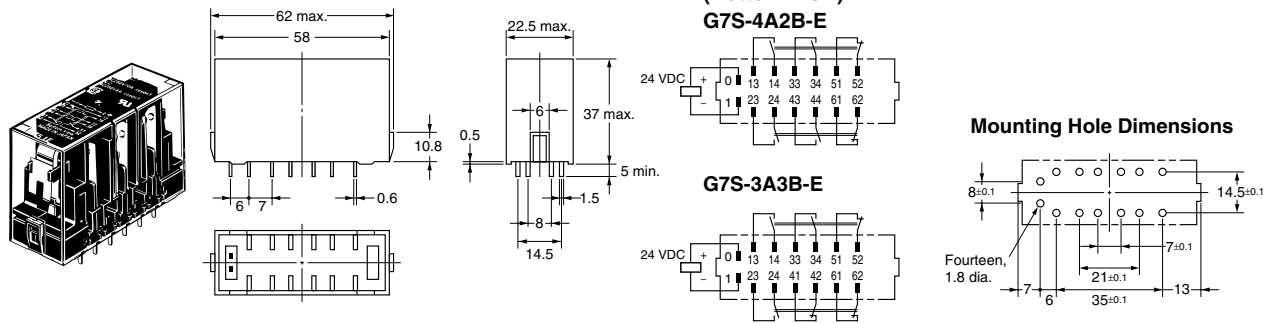Use the P7SA-14F-END in the ambient temperature range of 35 to 85%
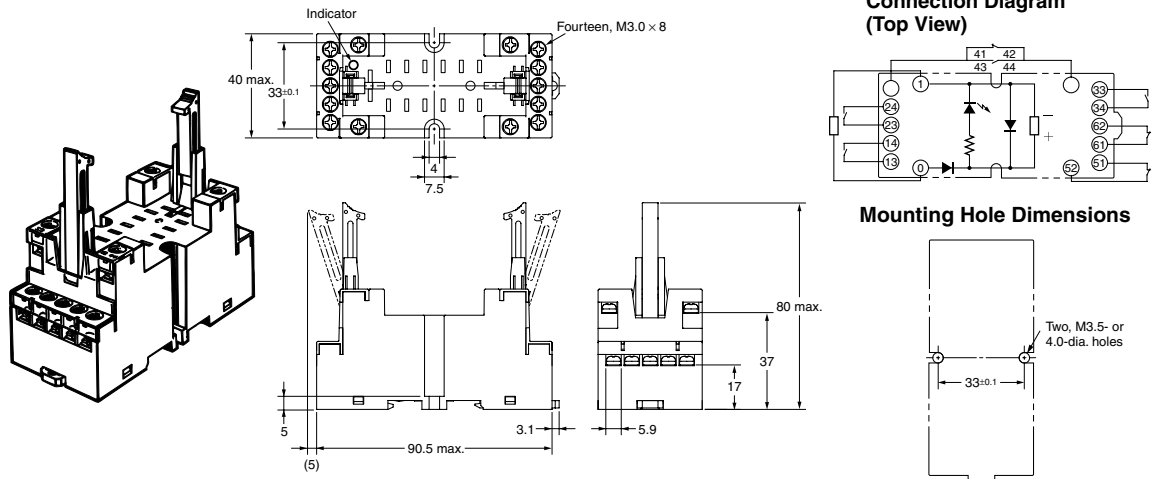*Measurement conditions: Measurement of the same points as for the dielectric strength at 500 VDC.
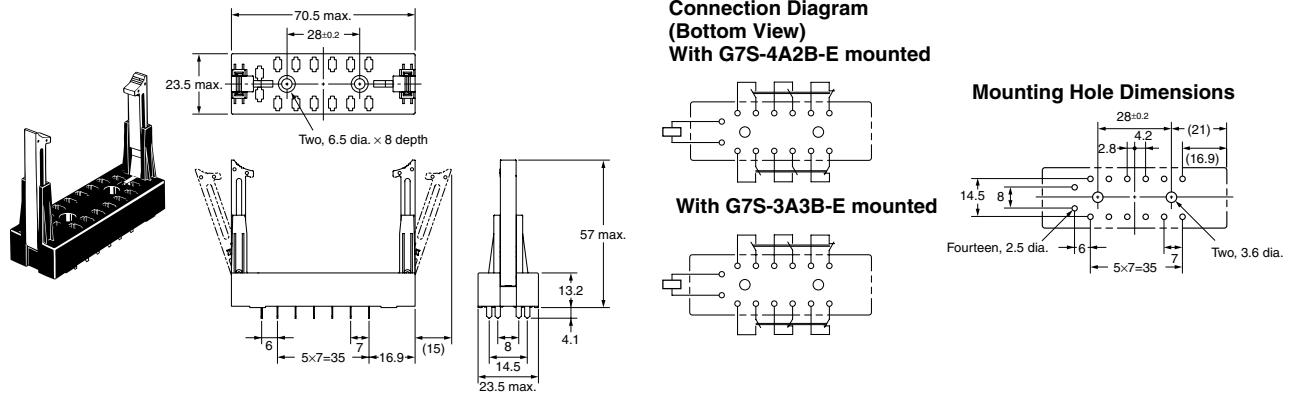
Dimensions

(mm)

G7S-4A2B-E
G7S-3A3B-E

62 max.
58
22.5 max.
6
37 max.
10.8
0.5
5 min.
6 7
0.6
1.5
8
14.5

Terminal Arrangement/Internal Connection Diagram (Bottom View)

G7S-4A2B-E

24 VDC

| 0 | 13 | 14 | 33 | 34 | 51 | 52 |
| 1 | 23 | 24 | 43 | 44 | 61 | 62 |

G7S-3A3B-E

24 VDC

| 0 | 13 | 14 | 33 | 34 | 51 | 52 |
| 1 | 23 | 24 | 41 | 42 | 61 | 62 |

Mounting Hole Dimensions

8±0.1
14.5±0.1
7±0.1
Fourteen, 1.8 dia.
7 6
21±0.1
13
35±0.1

Track-mounting Socket
P7S-14F-END

Indicator
Fourteen, M3.0 × 8
40 max.
33±0.1
4
7.5
80 max.
37
17
5
3.1
5.9
90.5 max.
(5)

Terminal Arrangement/Internal Connection Diagram (Top View)

	41	42	
1	43	44	33
24			34
23			62
14			61
13	0		52
			51

Mounting Hole Dimensions

Two, M3.5- or 4.0-dia. holes
33±0.1

Back-mounting Socket (PCB Terminals)
P7S-14P-E

70.5 max.
28±0.2
23.5 max.
Two, 6.5 dia. × 8 depth
57 max.
13.2
4.1
6
7
(15)
5×7=35
16.9
8
14.5
23.5 max.

Terminal Arrangement/Internal Connection Diagram (Bottom View)
With G7S-4A2B-E mounted

With G7S-3A3B-E mounted

Mounting Hole Dimensions

28±0.2
(21)
4.2
(16.9)
2.8
14.5
8
Fourteen, 2.5 dia.
6
5×7=35
7
Two, 3.6 dia.

Ordering

Model Number Legend

G7S – ☐ A ☐ B – E
      ❶   ❷

❶ NO Contact Poles
   3:   3PST-NO
   4:   4PST-NO

❷ NC Contact Poles
   2:   DPST-NC
   3:   3PST-NC

Relays with Forcibly Guided Contacts

Type	Poles	Contact Configuration	Rated Voltage*	Model
Standard	6 poles	4PST-NO, DPST-NC	24 VDC	G7S-4A2B-E
		3PST-NO, 3PST-NC		G7S-3A3B-E

Sockets

Type		Rated Voltage	Model
Track-mounting	Common for track mounting and screw mounting	24 VDC	P7S-14F-END
Back-mounting	PCB terminals	–	P7S-14P-E

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J7KNA-AR

Mini Contactor Relays 4-Pole

- AC and DC operated
- 4-, 6- and 8-pole versions in different configurations
- Mirrored contacts
- Screw fixing and snap fitting (35 mm DIN rail)
- Rated current = 10 A (I_{th})
- Suitable for electronic devices (DIN 19240)
- Finger proof (VBG 4)

Accessories

- 2- and 4-pole additional auxiliary contacts in different configurations

Specifications

Electrical	
Operating Coil	
Supply Power:	24 VDC, 110 VAC or 230 VAC
Inrush:	25 VA for AC versions 3 W for DC versions
Power Usage:	4.5 VA for AC versions 2.5 W for DC versions
Rated Carry Current:	10 A @ 40C
Switching Capability Inductive Loads (AC-15, DC-13)	
AC:	Break 120 V - 6 A, 240 V - 3 A (continuous 10 A)
DC:	24 V - 3 A
Max. Switching Frequency:	10,000 per hour
Min. Switching Current:	5 mA
Max. Drop-Out Time*:	8-25 ms for AC versions 8-25 ms for DC versions
Mechanical	
Mechanical Life:	1 x 10^7 operations min.
Mounting:	35 mm DIN rail or 4 screw holes for panel mounting
Wire Size:	Screw terminals accept two 14 AWG solid or stranded wires
Weight:	AC versions: 160 g (5 oz.) DC versions: 190 g (6 oz.)
Vibration:	5 to 300 Hz
Environmental	
Vibration Resistance:	2 g with control relay open; 4 g with control relay closed
Operating Temperature:	-40 to 60°C (-40 to 140°F)
Approvals:	IEC947-5-1, VDE 0660, EN60947-5-1, UL508

*The Drop-Out Time is the time it takes for the N/O contacts to open after the coil voltage is turned OFF.

Specifications are subject to change without notice.
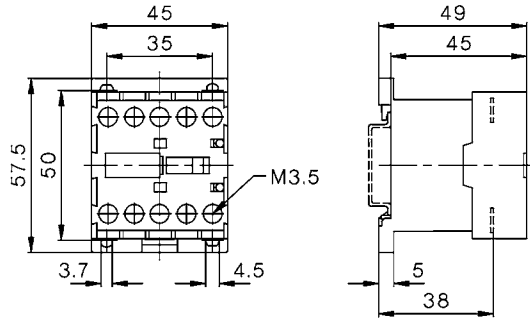
Approved Standards

Standard	Guide No. (US,C)
UL NKCR, NKCR7	
ICE 947-5-1	
VDE 0660	
EN 60947-5-1	

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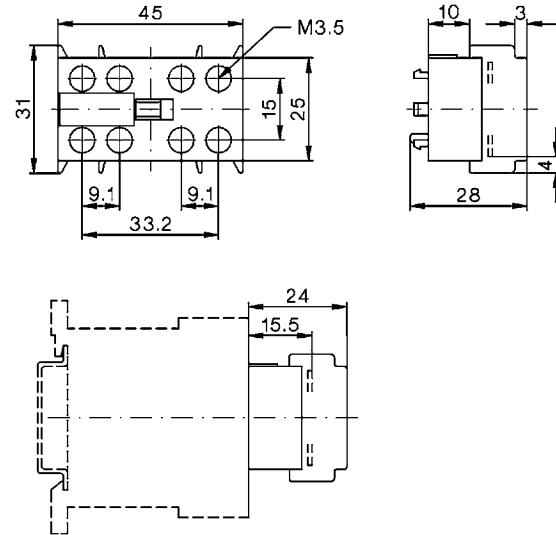
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Dimensions

(mm)

AC and DC Operated with Screw Terminals
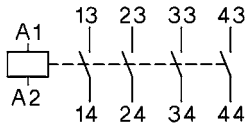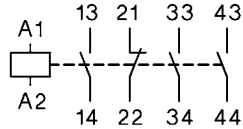### J7KNA-AR

Auxiliary Contact Blocks
J73KN-A
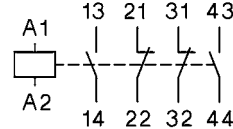
Contact Diagrams

Mini Contactor Relays, 4-Pole
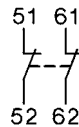
J7KNA-AR-40

J7KNA-AR-31

J7KNA-AR-22
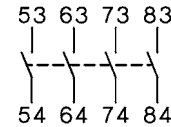
Auxiliary Contact Blocks for Contactor Relays J7KNA-AR

J73KN-A-11

J73KN-A-02

J73KN-A-40
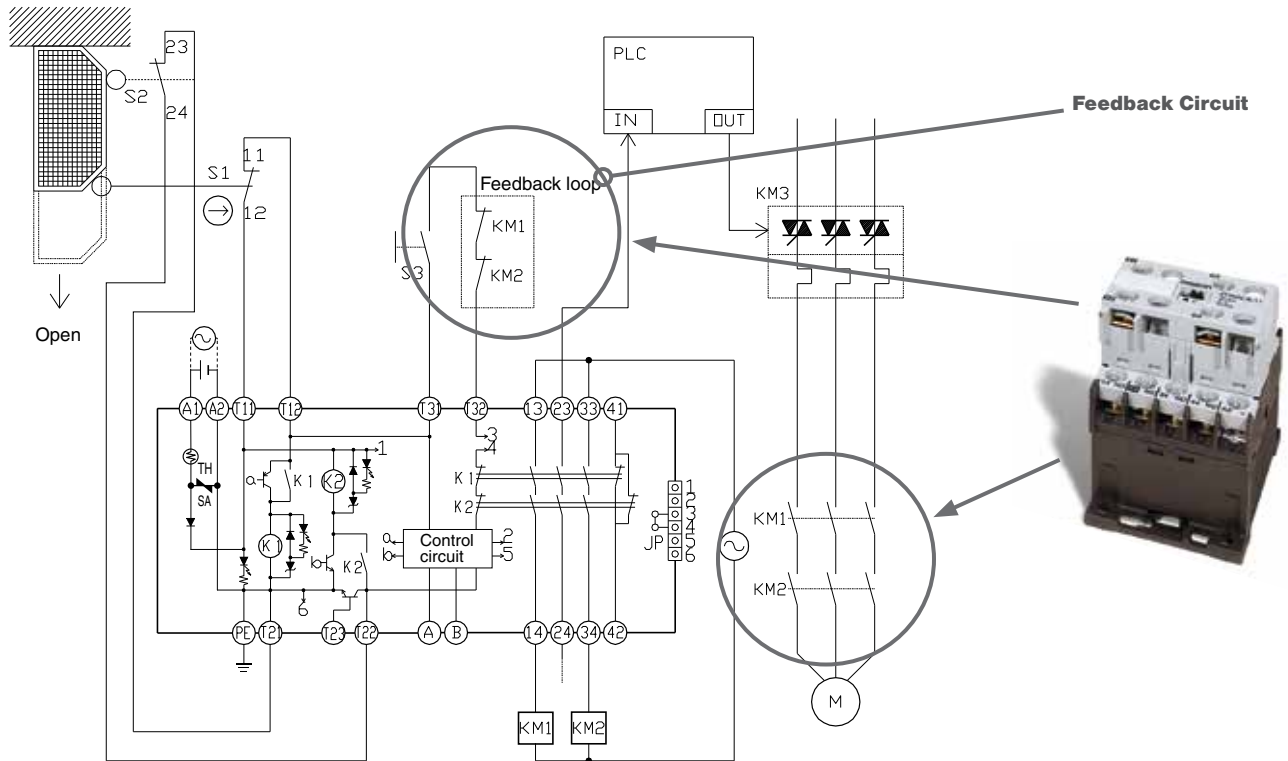
J73KN-A-22

I

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I-59

Mirror Contacts

Safety Function with Mirror Contacts

EN 60947-4-1 certification for mirror contact mechanisms has been obtained by using a combination of a relay and auxiliary contact blocks (5 VDC, 1 mA), enabling application in feedback circuits of safety circuits.
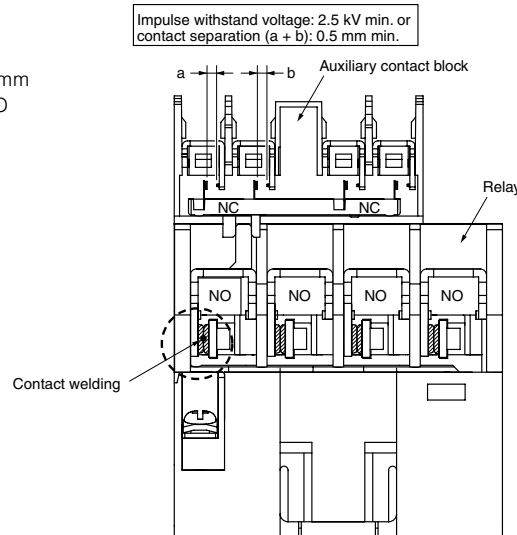
Application Example: General Safety Circuit

G9SA-301 (24 VAC/DC) (two limit switch input channels with manual reset)

Mirror Contact Mechanism

By combining a Relay with an auxiliary contact block, all NC contacts of the auxiliary contact block will satisfy an impulse withstand voltage of 2.5 kV or higher or maintain a gap of 0.5 mm or greater when the coil is de-energized even if at least one NO contact (main contact) of the Relay is welded.

Impulse withstand voltage: 2.5 kV min. or contact separation (a + b): 0.5 mm min.

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Ordering

Model Number Legend

Mini Contactor Relays

J7KNA – AR – ☐ – ☐
          ❶ ❷

❶ Combination of NO/NC Contacts
   22:    2 NO/2 NC
   31:    3 NO/1 NC
   40:    4 NO

❷ Coil Voltage (AC operated)
   24:     AC 24 V 50/60 Hz
   110: AC 110-115 V 50 Hz, AC 120-125 V 60 Hz
   230: AC 220-230 V 50 Hz, AC 240 V 60 Hz

   Coil Voltage (DC operated)
   24VS: 24 VDC with suppression

Auxiliary Contact Modules for Mini Motor Contactor Relays

J73KN – A – ☐
         ❶

❶ Combination of NO/NC Contacts
   11:    1 NO/1 NC
   02:    2 NC
   22:    2 NO/2NC
   40:    4 NO

Model	Coil Voltage	Contacts	Part No.
AC Operated Relays			
J7KNA-AR-40 24	24 VAC	4 N/O	12010-4140
J7KNA-AR-31 24	24 VAC	3 N/O + 1 N/C	12010-4131
J7KNA-AR-22 24	24 VAC	2 N/O + 2 N/C	12010-4122
J7KNA-AR-40 110	110 VAC	4 N/O	12010-4240
J7KNA-AR-31 110	110 VAC	3 N/O + 1 N/C	12010-4231
J7KNA-AR-22 110	110 VAC	2 N/O + 2 N/C	12010-4222
J7KNA-AR-40 230	230 VAC	4 N/O	12010-4340
J7KNA-AR-31 230	230 VAC	3 N/O + 1 N/C	12010-4331
J7KNA-AR-22 230	230 VAC	2 N/O + 2 N/C	12010-4322
DC Operated Relays (coil suppression built -in)			
J7KNA-AR-40 24VS	24 VDC	4 N/O	12010-4040
J7KNA-AR-31 24VS	24 VDC	3 N/O + 1 N/C	12010-4031
J7KNA-AR-22 24VS	24 VDC	2 N/O + 2 N/C	12010-4022
Auxiliary Contact Modules			
J73KN-A-11		1 N/C + 1 N/O	12010-4411
J73KN-A-02		2 N/C	12010-4402
J73KN-A-40		4 N/O	12010-4440
J73KN-A-22		2 N/O + 2 N/C	12010-4422

Multi-pole Power Relay for Contactor Current Range Capable of Carrying and Switching 40 A at 440 VAC

· One pole, 40 A can be carried and switched.
· The maximum load capacity of 160 A when using 4-pole parallel connections.
· All materials used are compliant with the RoHS Directive
· EN 60947-4-1 certification for mirror contact mechanisms has been obtained by using a combination of the relay and auxiliary contact blocks.
· A design with a small number of openings makes it difficult for dust or foreign matter to enter.
· Ideal for supply power to industrial inverters, servo drivers, and other devices, and switching power to motors and other equipment.

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Specifications

Approved Standards

UL Standard: UL508, UL840 (File No. E41643)

Model	Coil Ratings		Contact Ratings	Number of Test Operations
G7Z	12, 24 VDC	NO contact	40 A, 480 VAC, 60 Hz (Resistive)	80,000
			5 A, 120 VDC (Resistive)	100,000
			22 A, 480 VAC, 60 Hz (General Use)	100,000
			D300* (1-A current applied)	—
		NC contact	25 A, 480 VAC, 60 Hz (Resistive) 5 A, 120 VDC (Resistive) 10 A, 480 VAC, 60 Hz (General Use)	100,000
			D300* (1-A current applied)	—

*Auxiliary contact ratings

Model	Contact Ratings	
G73Z	NO contact	D300 (1-A current applied)
	NC contact	

CSA Standard: CSA Certification: CSA C22.2 No. 14

EN Standard/TÜV Certification: EN 60947-4-1 (Certification No. R50079155)

Model	Coil Ratings		Contact Ratings
G7Z	12, 24 VDC	NO contact	AC-1: 40 A, 440 V, 50/60 Hz AC-3: 16 A, 440 V, 50/60 Hz DC-1: 5 A, 110 V *AC-15: 0.5 A, 440 V, 50/60 Hz *DC-13: 0.5 A, 110 V
		NC contact	AC-1: 25 A, 440 V, 50/60 Hz DC-1: 5 A, 110 V *AC-15: 0.5 A, 440 V, 50/60 Hz *DC-13: 0.5 A, 110 V
G73Z	—	NO contact	AC-15: 0.5 A, 440 V , 50/60 Hz DC-13: 0.5 A, 110 V
		NC contact	

*Auxiliary contact ratings

Reference Information
UL 508:   Industrial control devices
UL 840:   Insulation coordination including clearance and creepage distance for electrical devices
CSA C22.2 No. 14:   Industrial control devices
EN 60947-4-1:   Contactors

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Specifications (continued)

Ratings

Coil

Rated Voltage	Rated Current (mA)	Coil Resistance (Ω)	Must operate Voltage	Must release Voltage	Maximum Voltage	Power Consumption (W)
			Percentage of Rated Voltage			
12 VDC	308	39	75% max.	10% min.	110%	Approx. 3.7
24 VDC	154	156				

Notes:
1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±15%.
2. Operating characteristics were measured at a coil temperature of 23°C.
3. The maximum allowable voltage is the maximum value of the fluctuation range from the relay coil operating power supply and was measured at an ambient temperature of 23°C. There is, however, no continuous allowance.

Contacts

Relay

		G7Z-4A-☐Z, G7Z-3A1B-☐Z, G7Z-2A2B-☐Z		
		Resistive load	Inductive load cosø = 0.3	Resistive load L/R = 1 ms
Contact structure		Double break		
Contact material		Ag alloy		
Rated load	NO	40 A at 440 VAC	22 A at 440 VAC	5 A at 110 VDC
	NC	25 A at 440 VAC	10 A at 440 VAC	5 A at 110 VDC
Rated carry current	NO	40 A		
	NC	25 A		
Maximum contact voltage		480 VAC		125 VDC
Maximum contact current	NO	40 A	22 A	5 A
	NC	25 A	10 A	5 A
Maximum switching capacity	NO	17,600 VA	9,680 VA	550 W
	NC	11,000 VA	4,400 VA	550 W
Failure rate P value (reference value)		2 A at 24 VDC		

Note: The ratings for the auxiliary contact block mounted on the G7Z are the same as those for the G73Z auxiliary contact block.

Auxiliary Contact Block

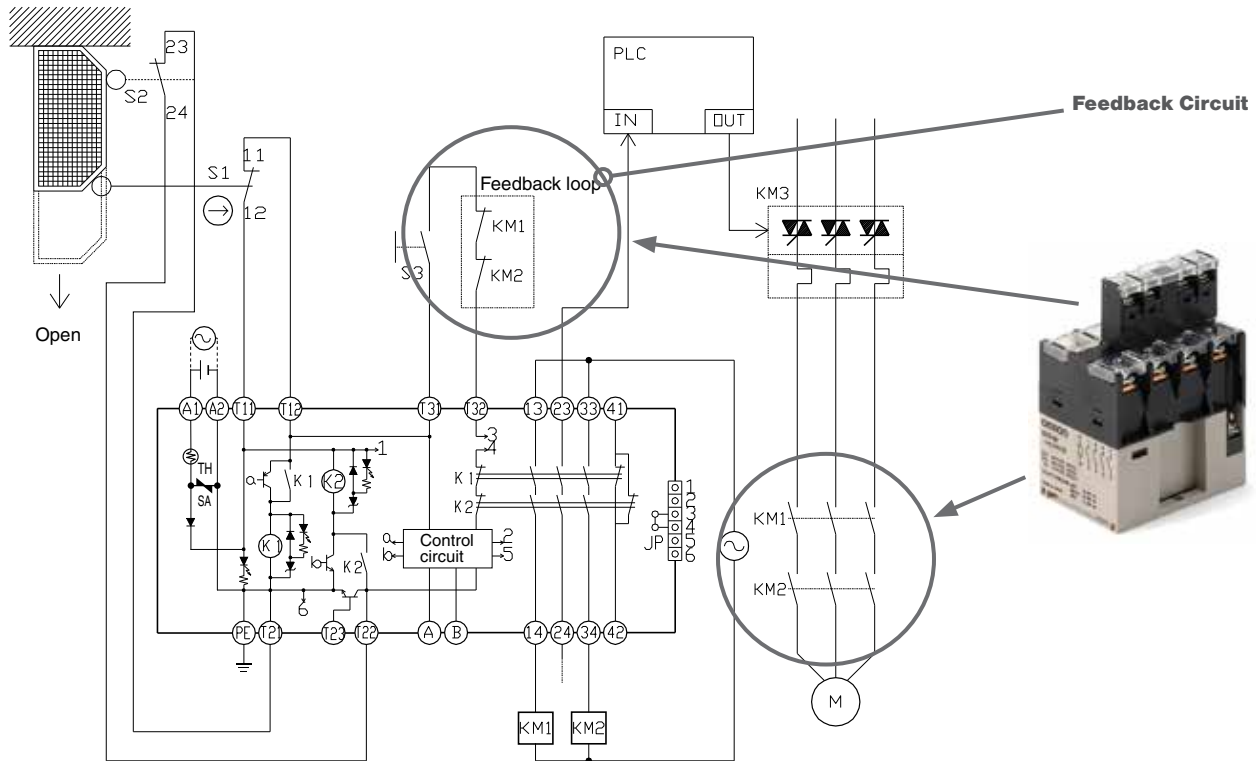|	G73Z-20Z, G73Z-11Z, G73Z-02Z		
	Resistive load	Inductive load cosø = 0.3	Resistive load L/R = 1 ms
Contact structure	Double break		
Contact material	Au clad + Ag		
Rated load	1 A at 440 VAC	0.5 A at 440 VAC	0.5 A at 110 VDC
Rated carry current	1 A		
Maximum contact voltage	480 VAC		125 VDC
Maximum contact current	1 A	0.5 A	
Maximum switching capacity	440 VA	220 VA	55 W
Failure rate P value (reference value)	1 mA at 5 VDC		

Mirror Contacts

Safety Function with Mirror Contacts

EN 60947-4-1 certification for mirror contact mechanisms has been obtained by using a combination of a relay and auxiliary contact blocks (5 VDC, 1 mA), enabling application in feedback circuits of safety circuits.
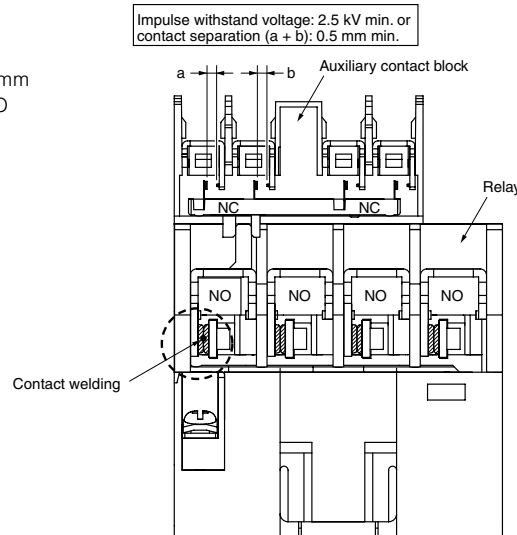
Application Example: General Safety Circuit

G9SA-301 (24-VAC/DC) (two limit switch input channels with manual reset)

Mirror Contact Mechanism

By combining a Relay with an auxiliary contact block, all NC contacts of the auxiliary contact block will satisfy an impulse withstand voltage of 2.5 kV or higher or maintain a gap of 0.5 mm or greater when the coil is de-energized even if at least one NO contact (main contact) of the Relay is welded.
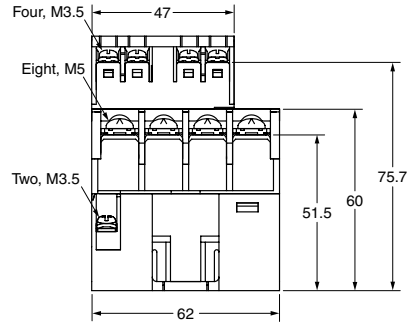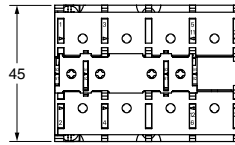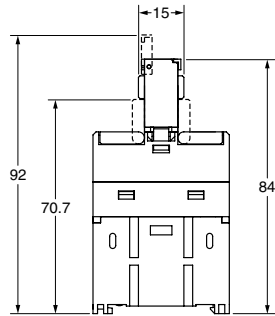
Impulse withstand voltage: 2.5 kV min. or contact separation (a + b): 0.5 mm min.

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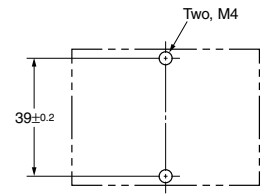AUTOMATION & SAFETY

Dimensions (mm)
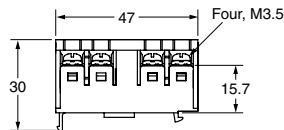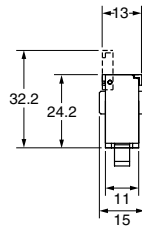
Relay (12 VDC, 24 VDC) with Auxiliary Contact Block
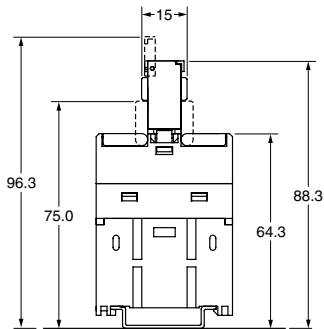#### 4 Poles

Mounting Hole Dimensions

Two, M4

39±0.2

45

Four, M3.5 — 47
Eight, M5
Two, M3.5

15
92
70.7
84

75.7
51.5
60
62

Auxiliary Contact Block

13
32.2
24.2
11
15
47 Four, M3.5
30
15.7

DIN Track Mounting Height
(when using PFP-100N or PFP-50N mounting rail)

15
96.3
75.0
88.3
64.3

Note: The dimensions are typical values.

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Ordering

Model Number Legend

Relay with Auxiliary Contact Block

G7Z – ☐ – ☐ ☐
　　　❶　❷❸

❶ Relay Contact Configuration
　4A:　　4PST-NO
　3A1B:　3PST-NO/SPST-NC
　2A2B:　DPST-NO/DPST-NC

❷ Contact Configuration of Auxiliary Contacts
　20:　DPST-NO
　11:　SPST-NO/SPST-NC
　02:　DPST-NC

❸ Contact Mechanism of Auxiliary Contacts
　Z:　Bifurcated crossbar contact

Auxiliary Contact Block

G73Z – ☐ ☐
　　　　❶ ❷

❶ Contact Configuration of Auxiliary Contacts
　20:　DPST-NO
　11:　SPST-NO/SPST-NC
　02:　DPST-NC

❷ Contact Mechanism of Auxiliary Contacts
　Z:　Bifurcated crossbar contact

Relay with Auxiliary Contact Block

Relay with Auxiliary Contact Block (for Screw Terminals)

Classification		Contact configuration		Rated Voltage	Model
		Relay	**Auxiliary Contact Block**		
Relay with Auxiliary Contact Block	4 poles + 2 poles	4PST-NO	DPST-NO	12, 24 VDC	G7Z-4A-20Z
			SPST-NO/SPST-NC		G7Z-4A-11Z
			DPST-NC		G7Z-4A-02Z
		3PST-NO/SPST-NC	DPST-NO		G7Z-3A1B-20Z
			SPST-NO/SPST-NC		G7Z-3A1B-11Z
			DPST-NC		G7Z-3A1B-02Z
		DPST-NO/DPST-NC	DPST-NO		G7Z-2A2B-20Z
			SPST-NO/SPST-NC		G7Z-2A2B-11Z
			DPST-NC		G7Z-2A2B-02Z

Notes:
1. Relay contact terminals are M5, and the coil terminals are M3.5.
2. Auxiliary contact block terminals are M3.5

Accessories (Order Separately)

Auxiliary Contact Block

Classification		Contact Configuration	Model
Auxiliary Contact Block	2 poles	DPST-NO	G73Z-20Z
		SPST-NO/SPST-NC	G73Z-11Z
		DPST-NC	G73Z-02Z