

Safety Relay Unit

G9SA

The G9SA Series Offers a Complete Line-up of Compact Units.

- 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.
- Simple expansion connection.
- OFF-delay models have 15-step OFF-delay settings.
- Conforms to EN standards.
- BG approval pending.
- UL, CSA approval pending.
- Both DIN track mounting and screw mounting are possible.



Note: Be sure to refer to the *Precautions* on page 11.

Ordering Information

Emergency-stop Units

Main contacts	Auxiliary contact	Number of input channels	Rated voltage	Model	Category
3PST-NO	SPST-NC	1 channel or 2 channels possible	24 VAC/VDC	G9SA-301	4
5PST-NO			24 VAC/VDC	G9SA-501	

Emergency-stop OFF-delay Units

Main contacts	OFF-delay contacts	Auxiliary contact	Number of input channels	OFF-delay time	Rated voltage	Model	Category
3PST-NO	DPST-NO	SPST-NC	1 channel or 2 channels possible	7.5 s	24 VAC/VDC	G9SA-321-T075	4
				15 s	24 VAC/VDC	G9SA-321-T15	
				30 s	24 VAC/VDC	G9SA-321-T30	

Note: 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	Category
3PST-NO	SPST-NC	1 channel or 2 channels possible	24 VAC/VDC	G9SA-TH301	4

Expansion Unit

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

Main contacts	Auxiliary contact	Model	Category
3PST-NO	SPST-NC	G9SA-EX301	4

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	Category
3PST-NO	SPST-NC	7.5 s	G9SA-EX031-T075	4
		15 s	G9SA-EX031-T15	
		30 s	G9SA-EX031-T30	

Note: 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

Model Number Legend

G9SA-□□□□□□-□□□□□□

1 2 3 4 5 6

1. Function

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

2. Contact Configuration (Safety Output)

0: None
 2: DPST-NO
 3: 3PST-NO
 5: 5PST-NO

3. Contact Configuration (OFF-delay Output)

0: None
 2: DPST-NO
 3: 3PST-NO

4. Contact Configuration (Auxiliary Output)

0: None
 1: SPST-NC

5. Input Configuration

None: 1-channel or 2-channel input possible
 1: 1-channel input
 2: 2-channel input

6. OFF-delay Time (Max. setting time)

None: No OFF-delay
 T075: 7.5 seconds
 T15: 15 seconds
 T30: 30 seconds

Specifications

■ Ratings

Power Input

Item	G9SA-301/TH301	G9SA-501	G9SA-321-T□
Power supply voltage	24 VAC/VDC: 24 VAC, 50/60 Hz, or 24 VDC		
Operating voltage range	85% to 110% of rated power supply voltage		
Power consumption (See note.)	24 VAC/VDC: 1.8 VA/1.7 W max.	24 VAC/VDC: 2.8 VA/2.6 W max.	24 VAC/VDC: 3.5 VA/3.3 W max.

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

Inputs

Item	G9SA-301/321-T□/TH301	G9SA-501
Input current (See note.)	40 mA max.	60 mA max.

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

Contacts

Item	G9SA-301/501/321-T□/TH301/EX301/EX031-T□
	Resistive load (cos ϕ =1)
Rated load	250 VAC, 5 A
Rated carry current	5 A

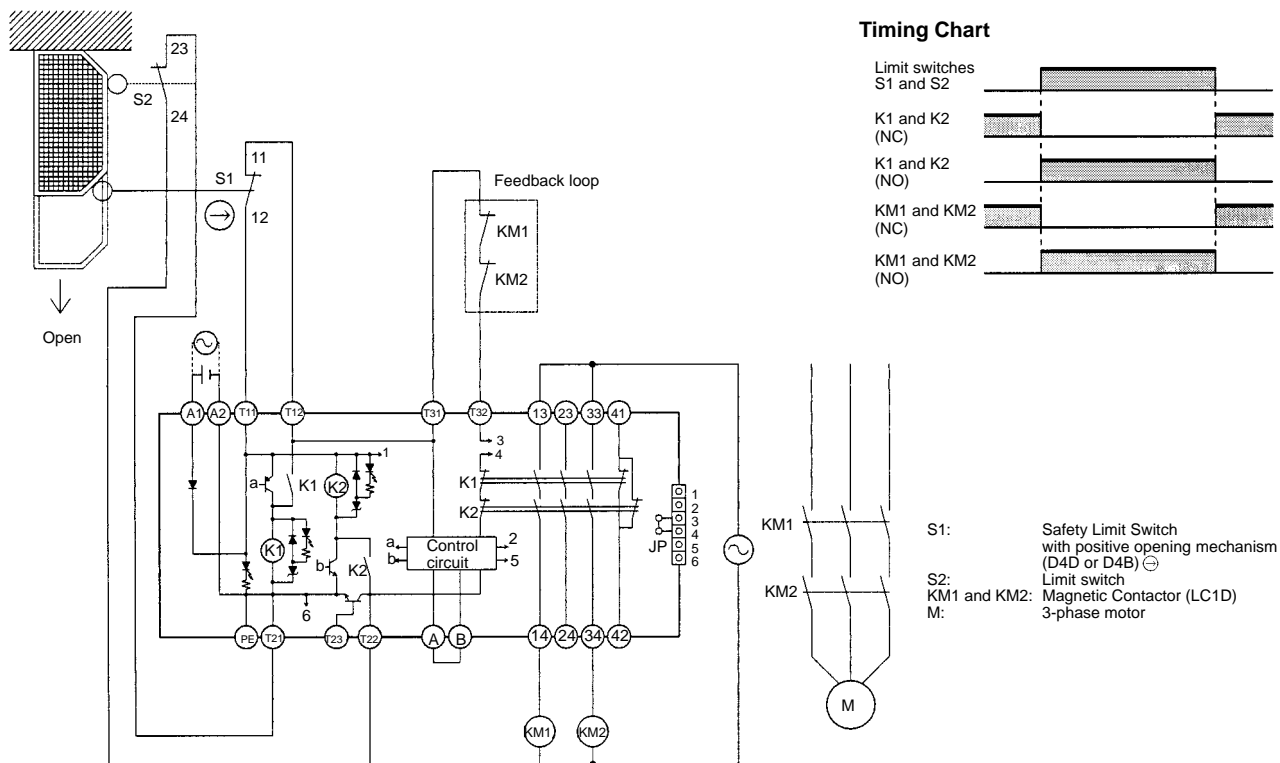
■ Characteristics

Item	G9SA-301/TH301	G9SA-501/321-T□	G9SA-EX301/EX031-T□
Contact resistance (see note 1)	100 m Ω		
Operating time	30 ms max. (not including bounce time)		
Response time (see note 2)	10 ms max. (not including bounce time)		
Insulation resistance (see note 3)	100 M Ω 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		
Vibration resistance	10 to 55 Hz, 0.75-mm double amplitude		
Shock resistance	Destruction	300 m/s ²	
	Malfunction	100 m/s ²	
Life expectancy	Mechanical	5,000,000 operations min. (at approx. 7,200 operations/hr)	
	Electrical	100,000 operations min. (at approx. 1,800 operations/hr)	
Error rate (P-level) (reference value)	5 VDC, 1 mA		
Ambient temperature	Operating: -25°C to 55°C (with no icing or condensation) Storage: -25°C to 55°C (with no icing or condensation)		
Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%		
Terminal tightening torque	0.98 N•m		
Weight	Approx. 210 g	Approx. 270 g	Approx. 130 g
Approved standards (see note 4)	EN954-1, EN60204-1, EN574 (-TH301), UL508, CSA C22.2 No. 14		
EMC (see note 4)	EMI: EN55011 group 1 class A EMS: EN50082-2 group 1		

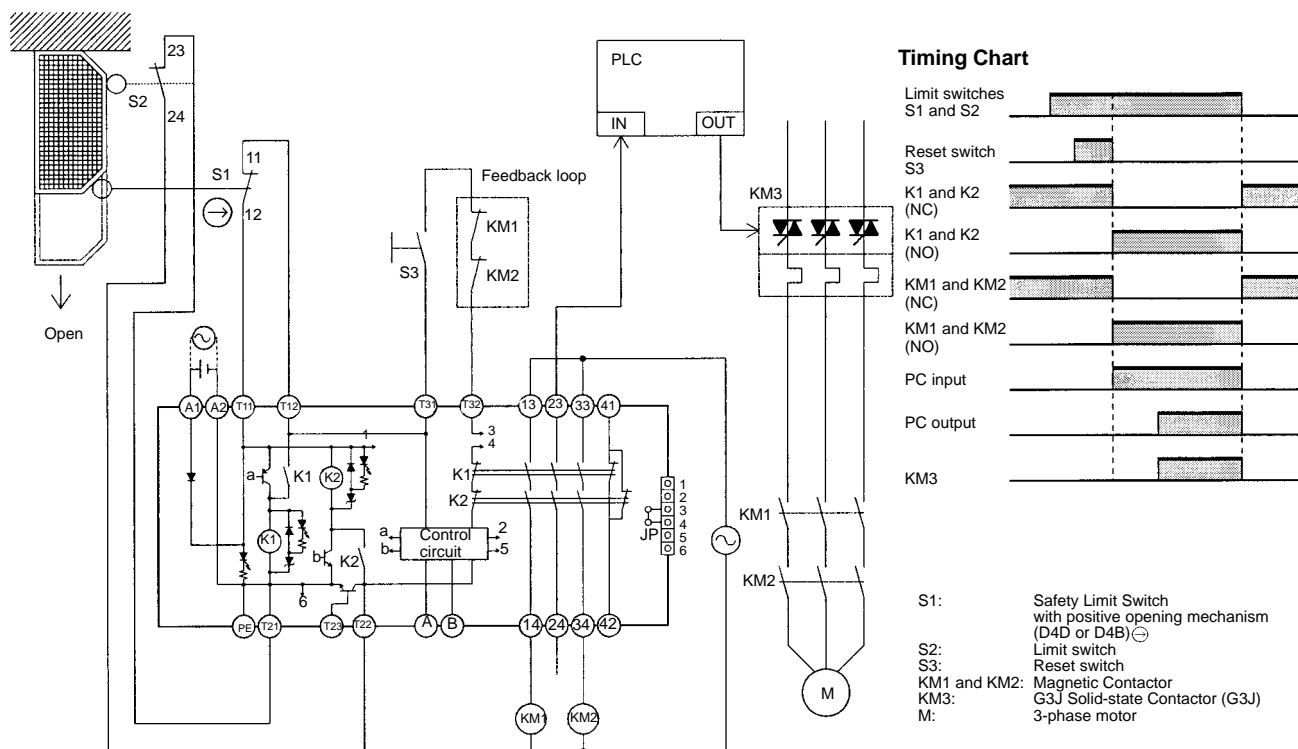
- Note:**
1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.
 2. The response time is the time it takes for the main contact to open after the input is turned OFF.
 3. The insulation resistance was measured with 500 VDC at the same places that the dielectric strength was checked.
 4. BG, UL, and CSA approval is pending.

Application Examples

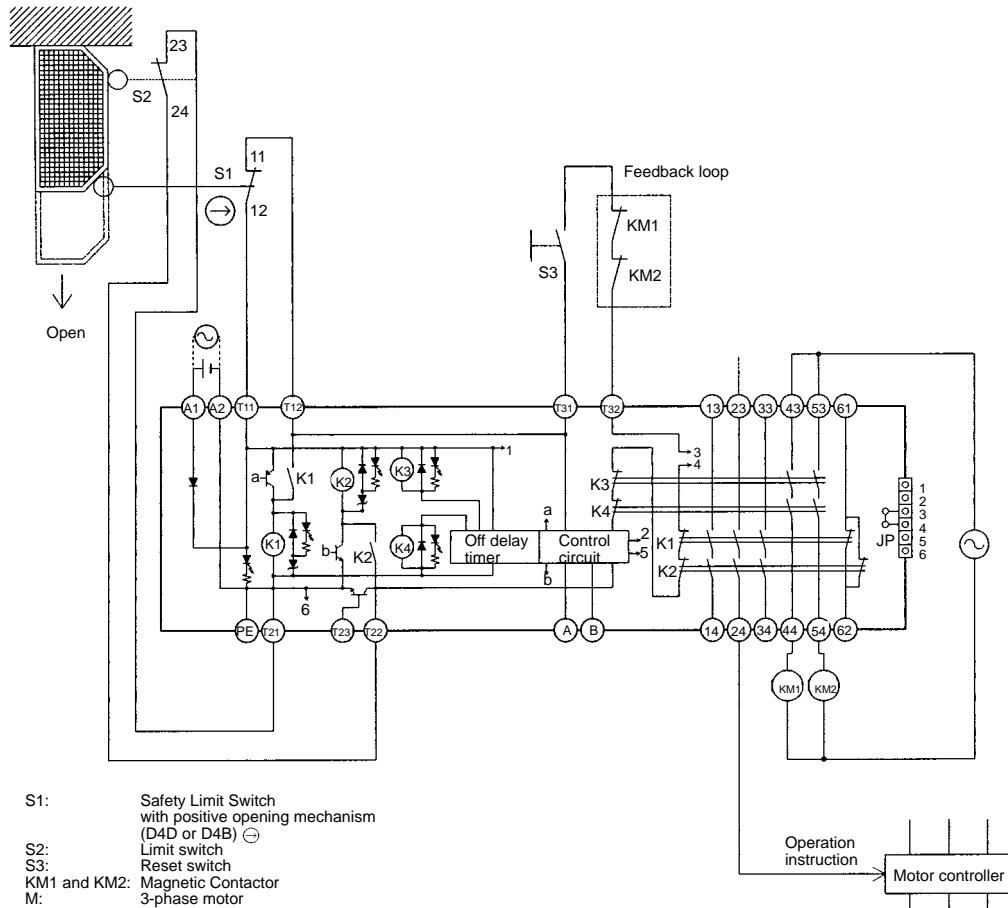
G9SA-301 (24 VAC/VDC) with 2-channel Limit Switch Input/Auto-reset



G9SA-301 (24 VAC/VDC) with 2-channel Limit Switch Input/Manual-reset

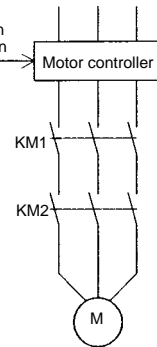
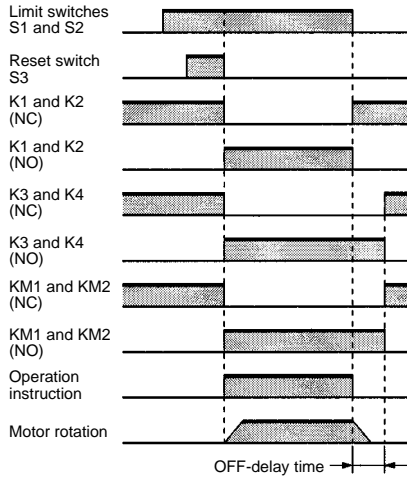


G9SA-321-T□ (24 VAC/VDC) with 2-channel Limit Switch Input/Manual-reset

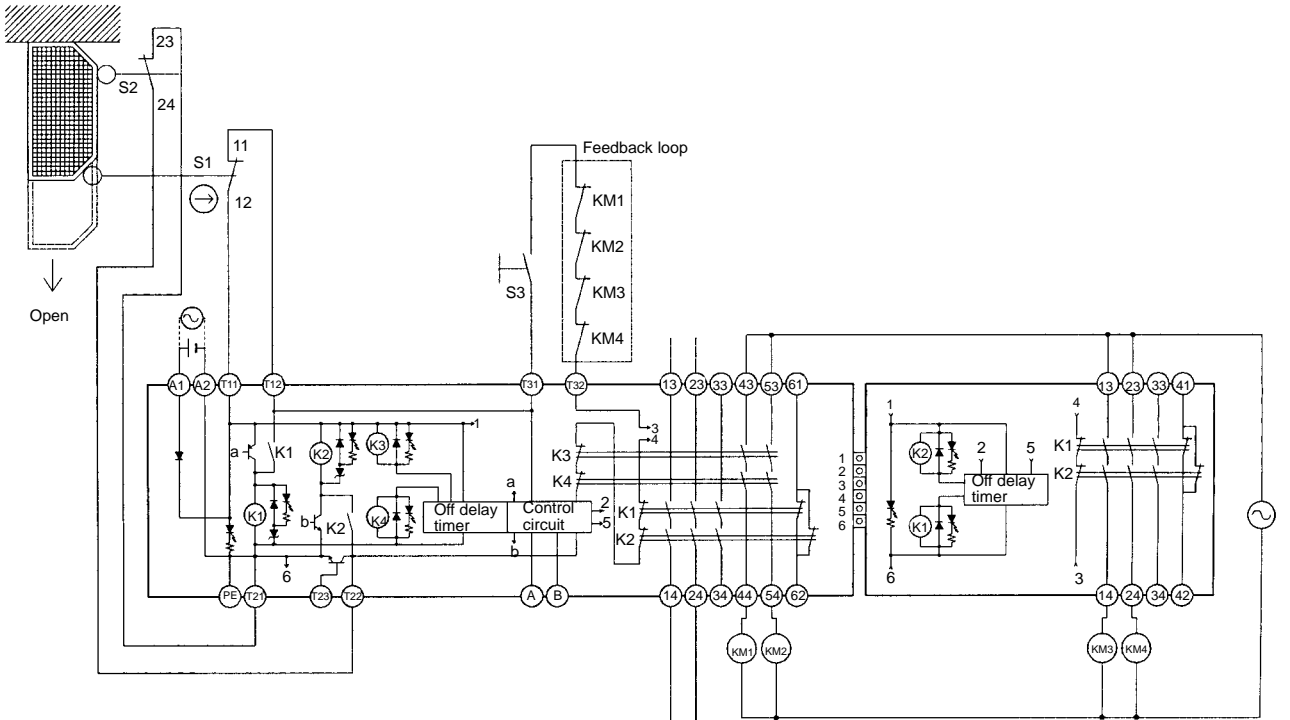


- S1: Safety Limit Switch with positive opening mechanism (D4D or D4B)
- S2: Limit switch
- S3: Reset switch
- KM1 and KM2: Magnetic Contactor
- M: 3-phase motor

Timing Chart

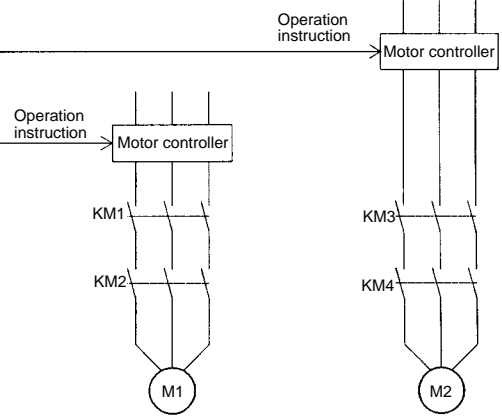
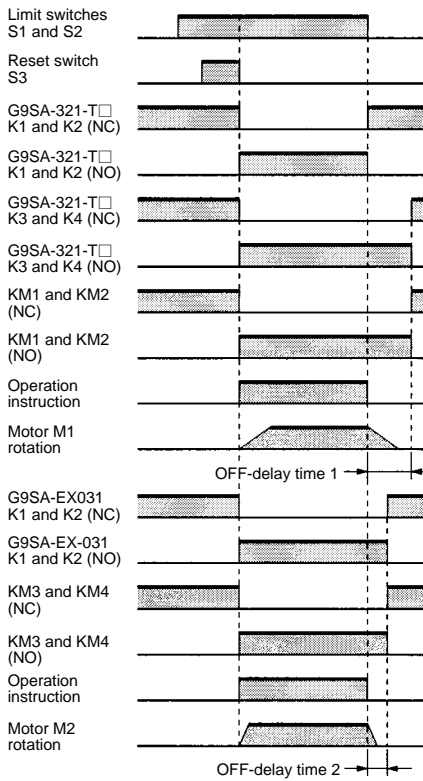


G9SA-321-T□ (24 VAC/VDC) + G9SA-EX031-T□ with 2-channel Limit Switch Input/Manual-reset

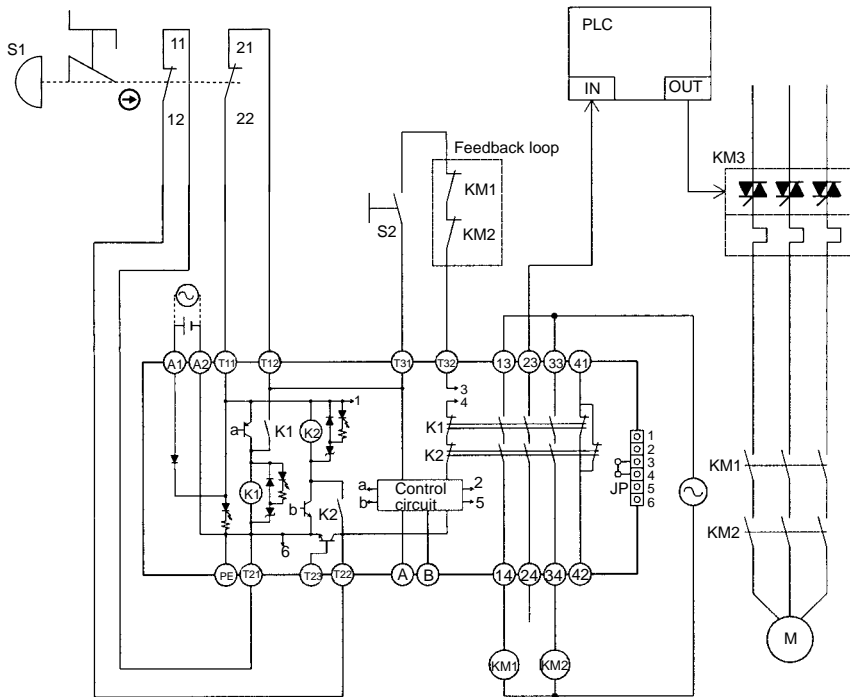


- S1: Safety Limit Switch with positive opening mechanism (D4D or D4B) ☺
- S2: Limit switch
- S3: Reset switch
- KM1 and KM2: Magnetic Contactor
- M1, M2: 3-phase motor

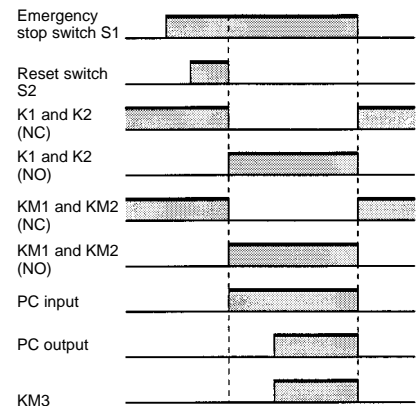
Timing Chart



G9SA-301 (24 VAC/VDC) with 2-channel Emergency Stop Switch Input/Manual-reset

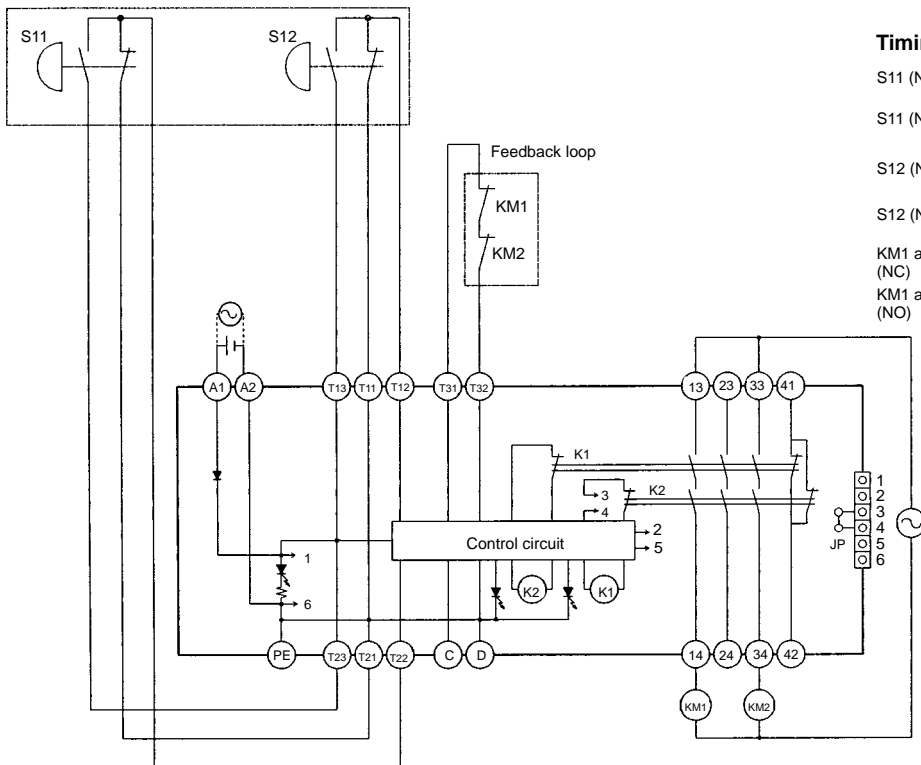


Timing Chart

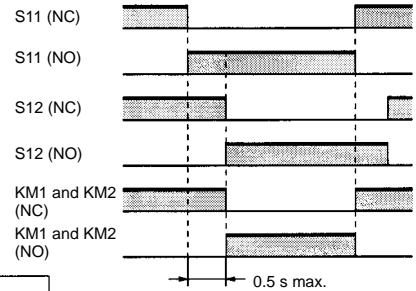


- S1: Emergency stop switch
- S2: Reset switch
- KM1 and KM2: Magnetic Contactor
- KM3: G3J Solid-state Contactor (G3J)
- M: 3-phase motor

G9SA-TH301 (24 VDC) with 2-hand 2-channel Inputs/Auto-reset

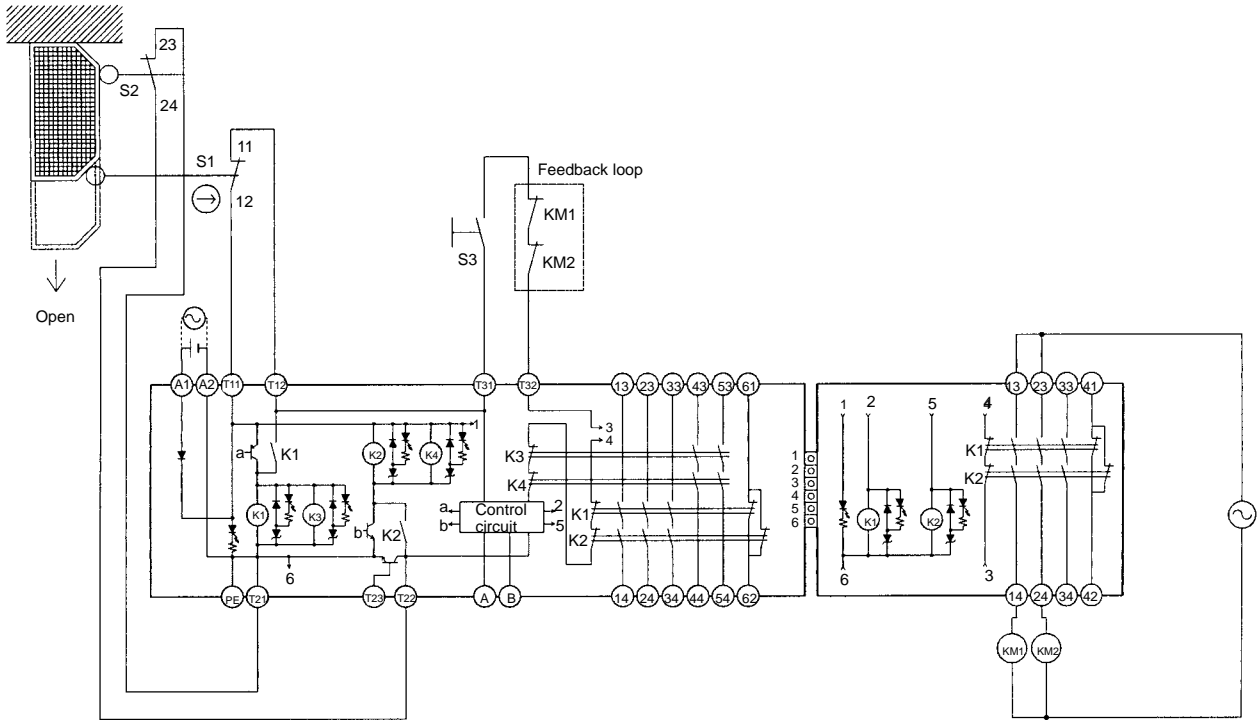


Timing Chart



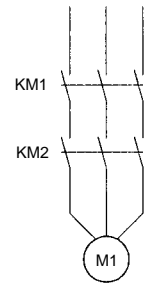
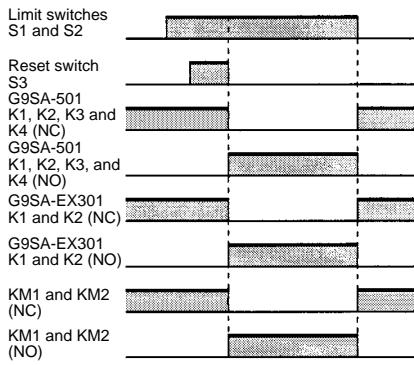
- S11, S12: Two-hand pushbutton switches
- KM1 and KM2: Magnetic Contactor

G9SA-501 (24 VAC/VDC) and G9SA-EX031 with 2-channel Limit Switch Input/Manual-reset



- S1: Safety Limit Switch with positive opening mechanism (D4D or D4B) ⊖
- S2: Limit switch
- S3: Reset switch
- KM1 and KM2: Magnetic Contactor
- M: 3-phase motor

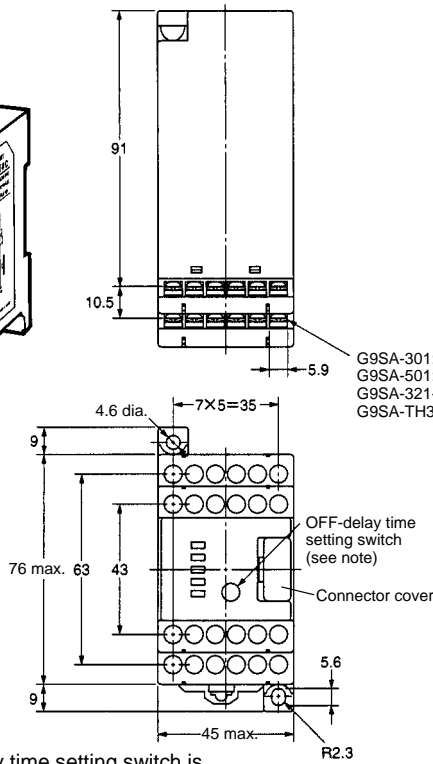
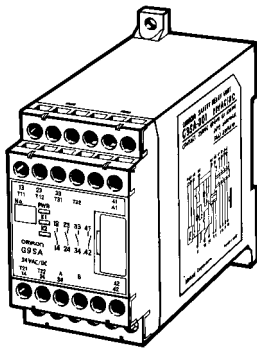
Timing Chart



Dimensions

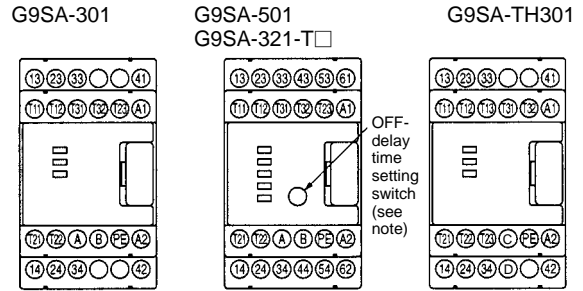
Note: All units are in millimeters unless otherwise indicated. The diagrams are drawn in perspective.

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

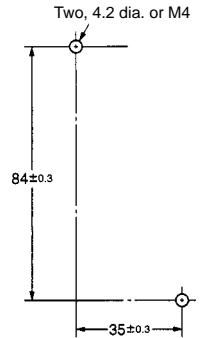


G9SA-301: Twenty, M3
G9SA-501: Twenty-four, M3
G9SA-321-T□: Twenty-four, M3
G9SA-TH301: Twenty-one, M3

Terminal Arrangement

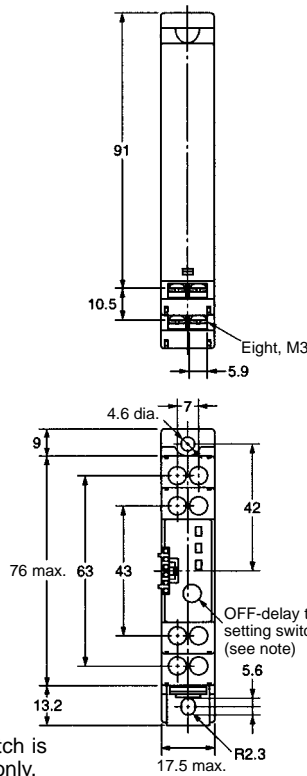
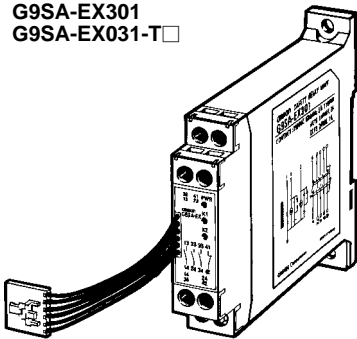


Mounting Holes

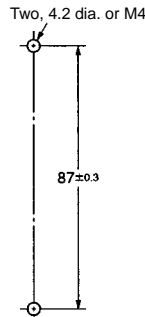


Note: The OFF-delay time setting switch is found on the G9SA-321-T□ only.

G9SA-EX301
G9SA-EX031-T□

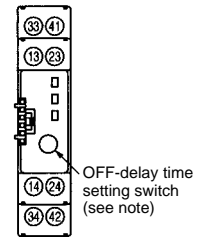


Mounting Holes

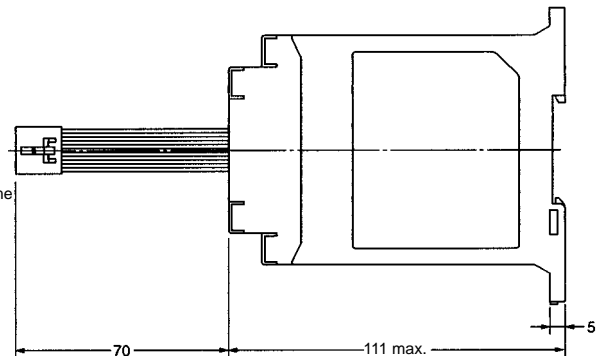


Terminal Arrangement

G9SA-EX301
G9SA-EX031-T□



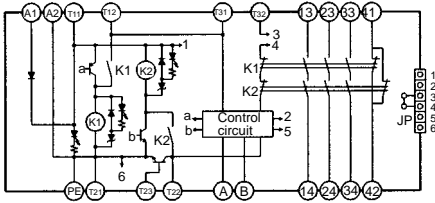
Note: The OFF-delay time setting switch is found on the G9SA-EX031-T□ only.



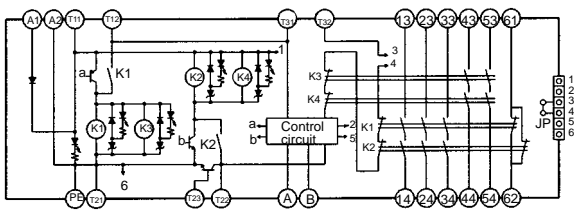
Installation

Internal Connections

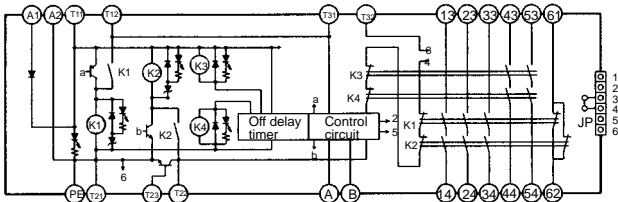
G9SA-301 (24 VAC/VDC)



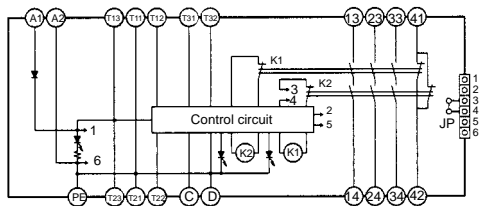
G9SA-501 (24 VAC/VDC)



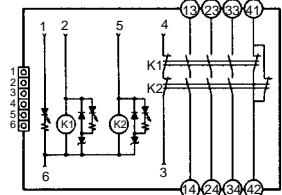
G9SA-321-T (24 VAC/VDC)



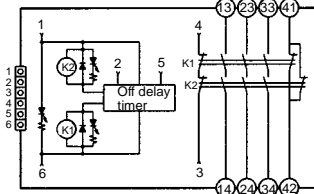
G9SA-TH301 (24 VAC/VDC)



G9SA-EX301



G9SA-EX031-T



Precautions

Wiring

Turn OFF the G9SA before wiring the G9SA. Do not touch the terminals of the G9SA while the power is turned ON, because the terminals are charged and may cause an electric shock.

Use the following to wire the G9SA.

Stranded wire: 0.75 to 1.5 mm²

Solid wire: 1.0 to 1.5 mm²

Tighten each screw to a torque of 0.78 to 1.18 N•m, or the G9SA may malfunction or generate heat.

External inputs connected to T11 and T12 or T21 and T22 of the G9SA-301 must be no-voltage contact inputs.

PE is a ground terminal.

When a machine is grounded at the positive, the PE terminal should not be grounded.

Mounting Expansion Units

Turn OFF the G9SA before connecting the Expansion Unit.

When an Expansion Unit is being used, remove the connector cover from the G9SA Safety Relay Unit (G9SA-301, G9SA-501, G9SA-321□, or G9SA-TH301) and insert the connector of the Expansion Unit's connector cable.

Applicable Safety Category (EN954-1)

All G9SA-series Relays meet the requirements of Safety Category 4 of the EN954-1 standards when they are used as shown in the examples provided by OMRON. The Relays may not meet the standards in some operating conditions.

The applicable safety category is determined from the whole safety control system. Make sure that the whole safety control system meets EN954-1 requirements.

Mounting Multiple Units

When mounting multiple Units close to each other, the rated current will be 3 A. Do not apply a current higher than 3 A.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. J121-E1-1 **In the interest of product improvement, specifications are subject to change without notice.**

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