

Ideal for Safety Door and Emergency Stop Switch Circuits

- Slim two-pole models only 22.5 mm wide
- Three-pole models only 68 mm wide
- Five-pole models only 91 mm wide
- OFF-delay feature in three-pole models
- Incorporates LED indicators for monitoring relays
- Uses replaceable fuses
- Finger-protection construction
- Both DIN track mounting and screw mounting possible (two-pole models)
- Approved Standards



Agency	Standard	File No.
BIA	EN60204-1 EN954-1	R974021
UL	UL508	E95399
CSA	CSA22.2No.14	LR35535

Note: Be sure to refer to the *Precautions* on page 15.

## Ordering Information

### ■ BASIC MODELS

Number of poles	Main contact form	Number of input channels	Rated voltage	Part number
2	DPST-NO	1 channel	24 VDC	<b>G9S-2001 DC24</b>
		2 channels		<b>G9S-2002 DC24</b>
3 (See Note.)	3PST-NO	2 channels	24 VDC	<b>G9S-301 DC24</b>
			24 VAC	<b>G9S-301 AC24</b>
			120 VAC	<b>G9S-301 AC120</b>
			240 VAC	<b>G9S-301 AC240</b>
5 (See Note.)	5PST-NO		24 VDC	<b>G9S-501 DC24</b>
			24 VAC	<b>G9S-501 AC24</b>
			120 VAC	<b>G9S-501 AC120</b>
			240 VAC	<b>G9S-501 AC240</b>

Note: Auxiliary contact is SPST-NC.

## ■ OFF-DELAY MODELS

Number of poles	Main contact form	OFF-delay form	Number of input channels	OFF-delay time	Rated voltage	Part number
3	3PST-NO	DPST-NO	2 channels	1 s	24 VDC	<b>G9S-321-T01 DC24</b>
					24 VAC	<b>G9S-321-T01 AC24</b>
					120 VAC	<b>G9S-321-T01 AC120</b>
					240 VAC	<b>G9S-321-T01 AC240</b>
				10 s	24 VDC	<b>G9S-321-T10 DC24</b>
					24 VAC	<b>G9S-321-T10 AC24</b>
					120 VAC	<b>G9S-321-T10 AC120</b>
					240 VAC	<b>G9S-321-T10 AC240</b>
				30 s	24 VDC	<b>G9S-321-T30 DC24</b>
					24 VAC	<b>G9S-321-T30 AC24</b>
					120 VAC	<b>G9S-321-T30 AC120</b>
					240 VAC	<b>G9S-321-T30 AC240</b>

Note: Each model has an SPST-NC auxiliary contact.

## Specifications

### ■ RATINGS

#### Controller Block

Part number	Rated voltage	Rated current	Rated power consumption
G9S-2001 G9S-2002	24 VDC	66 mA±20%	Approx. 1.6 W
G9S-301	24 VDC	62.5 mA ±20%	Approx. 1.5 W
	24 VAC	125 mA ±20%	Approx. 3 VA (60 Hz)
	120 VAC	25 mA ±20%	
	240 VAC	12.5 mA ±20%	
G9S-501	24 VDC	127 mA ±20%	Approx. 3 W
	24 VAC	229.2 mA ±20%	Approx. 5.5 VA (60 Hz)
	120 VAC	45.8 mA ±20%	
	240 VAC	22.9 mA ±20%	
G9S-321-T□	24 VDC	150 mA ±20%	Approx. 3.6 W
	24 VAC	256.2 mA ±20%	Approx. 6.1 VA (60 Hz)
	120 VAC	50.8 mA ±20%	
	240 VAC	25.4 mA ±20%	

Note: The above ratings are at an ambient temperature of 23°C.

**Contact**

Part number	G9S-301 G9S-501 G9S-321-T	G9S-2001 G9S-2002
Rated load	3 A at 240 VAC; (See Note.) $\cos\phi = 0.4$	5 A at 240 VAC; $\cos\phi = 0.4$
AC15 (IEC-947-5-1/ Table 4)	3 A at 240 VAC; $\cos\phi = 0.3$ ; 6,050 operations	
DC13 (IEC-947-5-1/ Table 4)	1 A at 24 VDC; L/R=100 ms; 6,050 operations	
Rated carry current	5 A	
Max. switching voltage	250 VAC, 24 VDC	
Max. switching capacity	AC: 1,250 VA; DC: 120 W	
Min. permissible load	50 mA at 24 VDC (operating frequency: 60 operations/min.)	

Note: If the load is 5 A at 240 VAC, the service life will be 40,000 times.

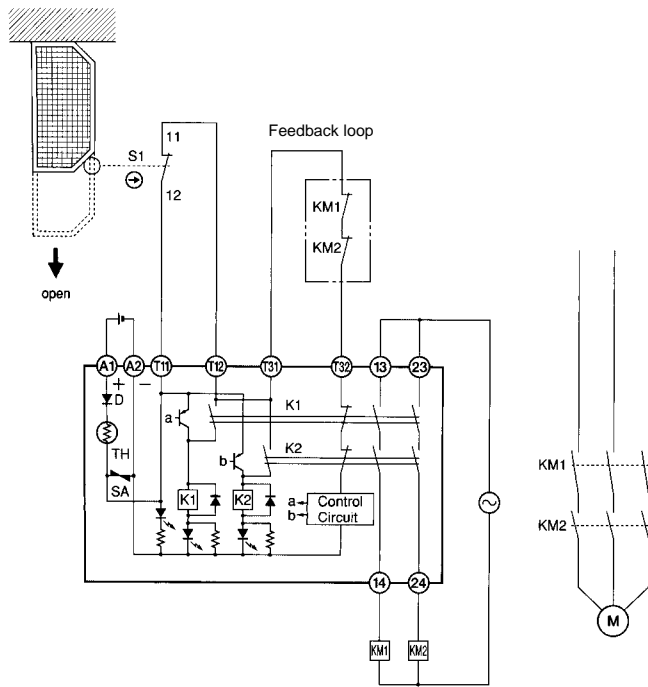
## ■ CHARACTERISTICS

Part number		G9S-2001 G9S-2002	G9S-301	G9S-501	G9S-321-T□
Input voltage/frequency		24 VDC ±10%, 50/60 Hz	24 VDC - 15% ±10%, 50/60 Hz; 24 VAC - 15% ±10% 50/60 Hz; 120 VAC - 15% ±10%, 50/60 Hz; 240 VAC -15% ±10%, 50/60 Hz		
Fuse protection		---	0.4 A		
Contact form of safety circuit		DPST-NO	3PST-NO	5PST-NO	3PST-NO
Contact form of auxiliary circuit		---	SPST-NC	SPST-NC	SPST-NC
Contact form of safety OFF-delay circuit		---	DPST-NO		
Contact resistance		200 mΩ	300 mΩ max. (measurement conditions: 5 VDC, 10 mA, voltage drops.)		
Operate time	(Rated voltage operation, does not include bounce time)	50 ms	300 ms max.		300 ms
Release time		50 ms	100 ms max.		100 ms; OFF-delay: 1 s, 10 s, 30 s
Max. switching frequency	Mechanical	1,800 operations/hr			
	Rated load	1,800 operations/hr			
Insulation resistance (at 500 VDC)		100 MΩ min. between control circuit and the safety and auxiliary circuits, between the safety circuits and auxiliary circuits, and between safety circuits			
Rated insulation voltage P.D. 3 (outside), P.D. 2 (inside) (IEC664-1, DIN VDE 0110/89)		250 V			
Rated impulse withstand voltage Overvoltage category 3 (IEC664-1, DIN VDE 0110/89)		4 kV			
Dielectric strength		2,500 VAC (50/60 Hz for 1 min.) between control circuit and the safety and auxiliary circuits, between the safety circuits and auxiliary circuits, and between safety circuits			
Vibration resistance (IEC68-2-6)	Mechanical	10 to 55 Hz, 0.75-mm double amplitude			
	Electrical	10 to 55 Hz, 0.5-mm double amplitude			
Shock resistance (IEC68-2-27)	Mechanical	300 m/s <sup>2</sup> (approx. 30G) for 11 ms			
	Electrical	50 m/s <sup>2</sup> (approx. 5G) for 11 ms			
Minimum applicable load (P standard reference value)		24 VDC, 50 mA			
Ambient temperature	Operating	-25°C to 55°C (-13°F to 131°F)			
	Storage	-25°C to 55°C (-13°F to 131°F)			
Relative humidity	Operating	38% to 85% RH			
	Storage	38% to 85% RH			
Enclosure rating (IEC529)	Terminals	IP20			
	Enclosure	IP40			
Terminal tightening torque		10 kgf • cm (0.98 N • m)			
Weight (See Note.)		Approx. 180 g	Approx. 365 g	Approx. 550 g	Approx. 580 g
Approved standards		UL508, CSA22.2 No. 14, EN954-1, EN60204-1			
EMC		EMI: EN55011 group 1 class A EMS: EN50082-2			

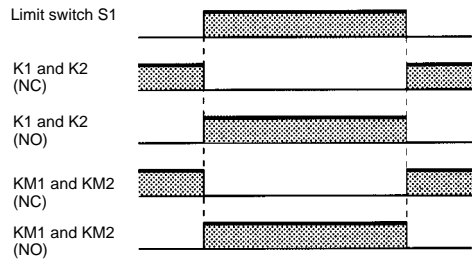
Note: These weights are for DC models. AC models are 200 g heavier.



**■ G9S-2001 WITH SINGLE-CHANNEL AUTO-RESET LIMIT SWITCH INPUT**

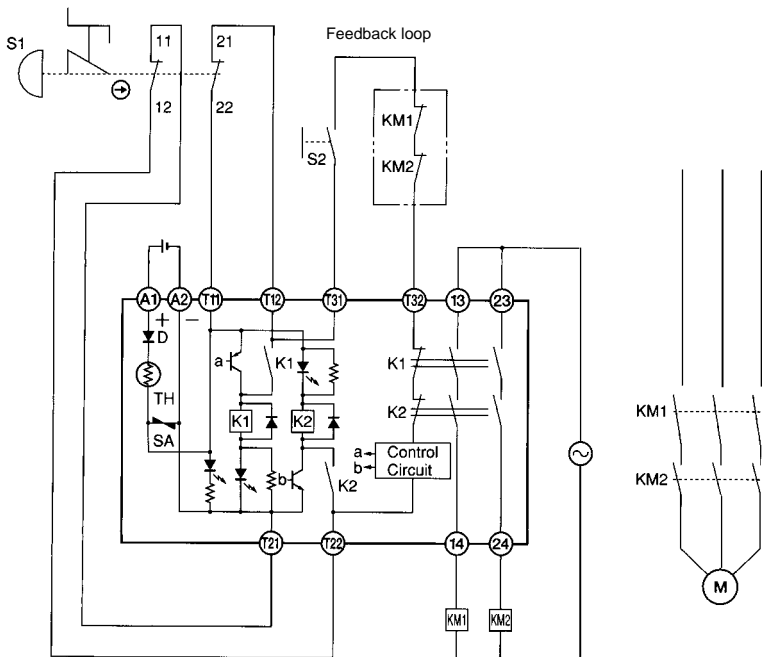


**Timing Chart**

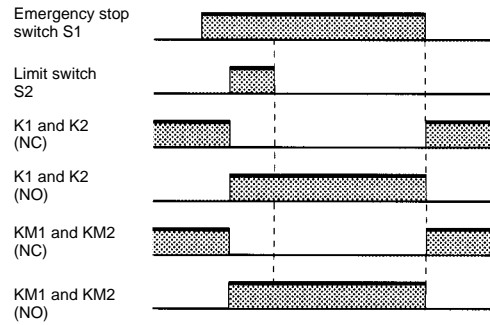


S1: Safety Limit Switch with positive opening mechanism (D4D and D4B)  
 KM1 and KM2: Magnet Contactor  
 M: 3-phase motor

**■ G9S-2002 WITH 2-CHANNEL MANUAL-RESET EMERGENCY STOP SWITCH INPUT**

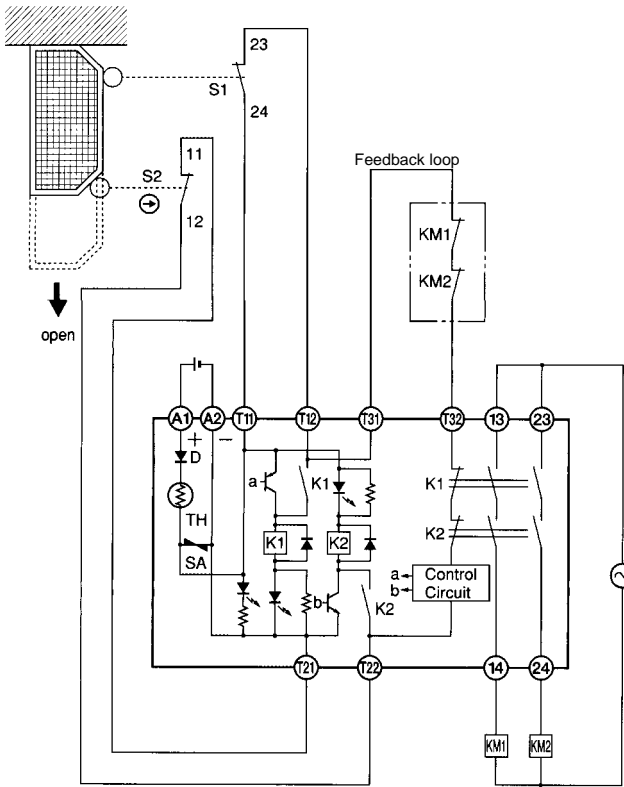


**Timing Chart**

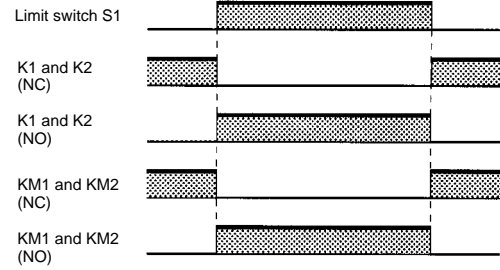


S1: Emergency stop switch with positive opening mechanism  
 S2: Starter switch  
 KM1 and KM2: Magnet Contactor  
 M: 3-phase motor

■ G9S-2002 WITH 2-CHANNEL AUTO-RESET LIMIT SWITCH INPUT

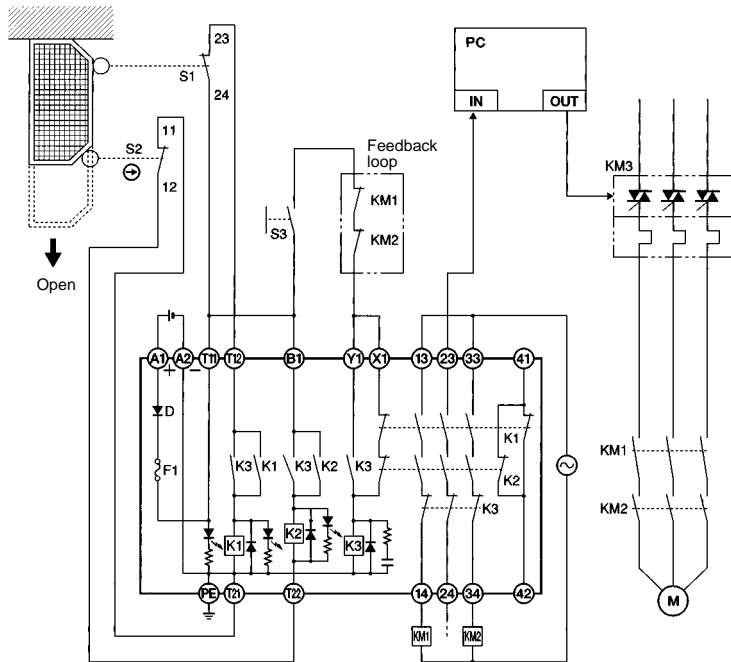


Timing Chart

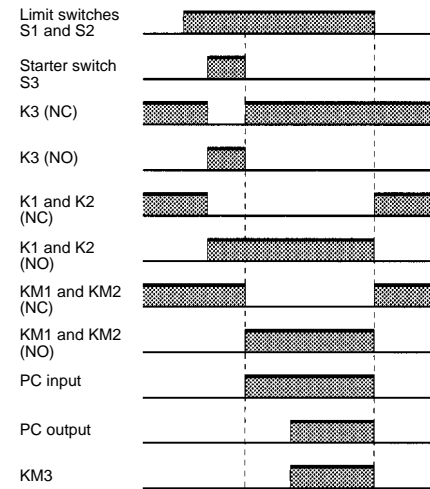


S1: Limit switch  
 S2: Safety Limit Switch with positive opening mechanism (D4D and D4B)  
 KM1 and KM2: Magnet Contactor  
 M: 3-phase motor

■ G9S-301 (24 VDC) WITH 2-CHANNEL LIMIT SWITCH INPUT

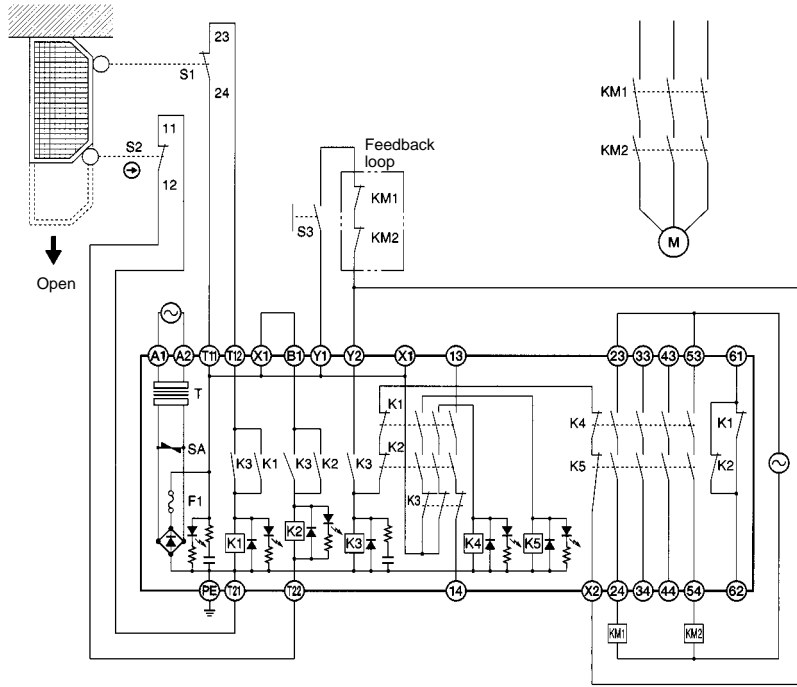


Timing Chart

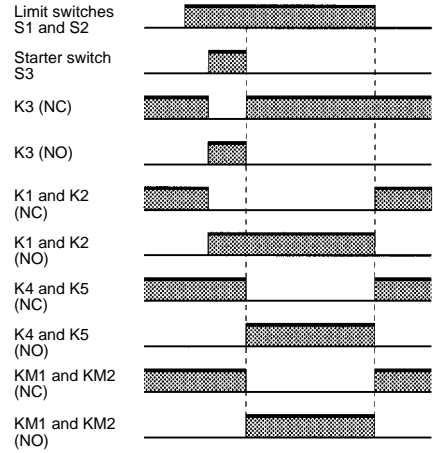


S1: Limit switch  
 S2: Safety Limit Switch with positive opening mechanism (D4D and D4B)  
 S3: Starter switch  
 KM1 and KM2: Magnet Contactor  
 KM3: G3J Solid-state Contactor  
 M: 3-phase motor

**G9S-501 (AC MODEL) WITH 2-CHANNEL LIMIT SWITCH INPUT**



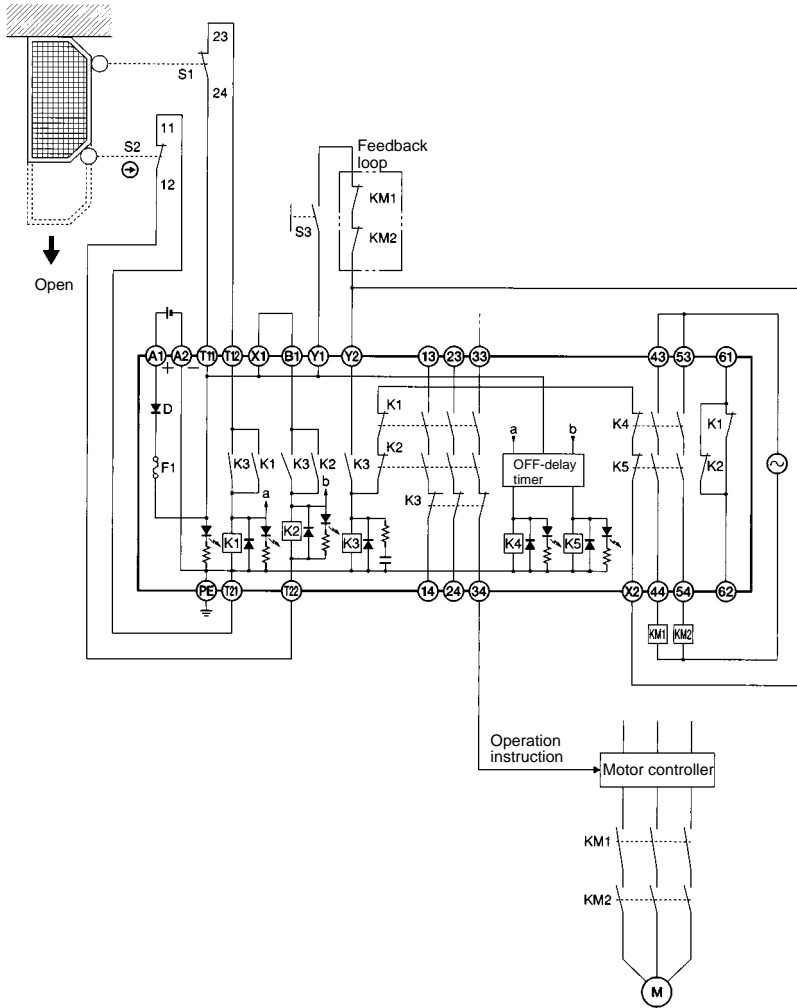
**Timing Chart**



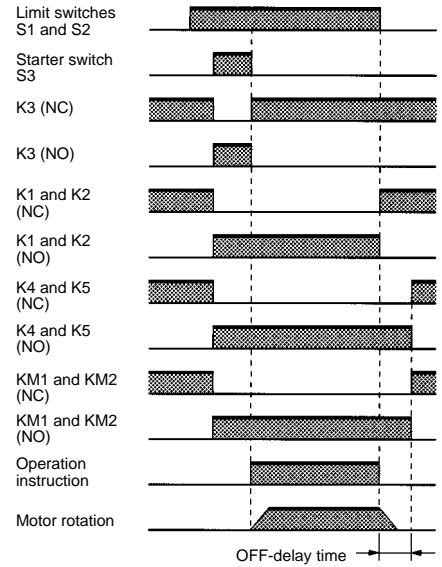
- S1: Limit switch
- S2: Safety Limit Switch with positive opening mechanism (D4D and D4B)
- S3: Starter switch
- KM1 and KM2: Magnet Contactor
- M: 3-phase motor



■ G9S-321-T (24 VDC) WITH 2-CHANNEL LIMIT SWITCH INPUT

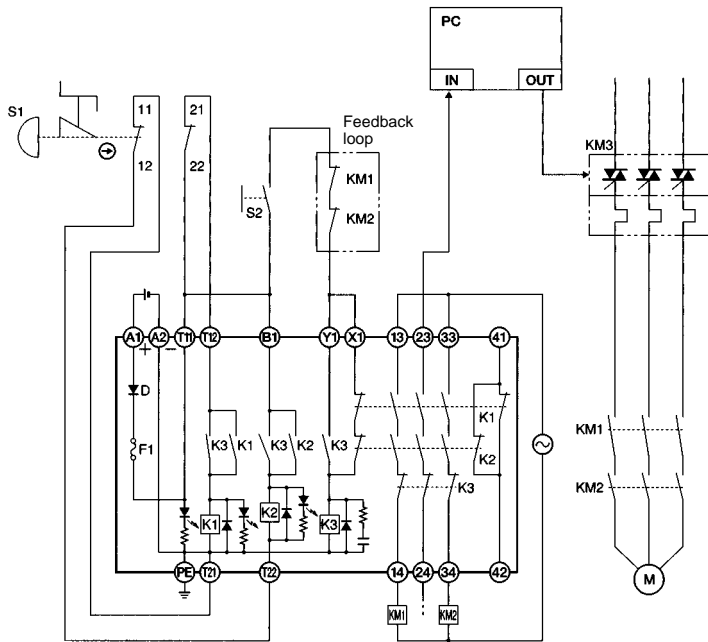


Timing Chart

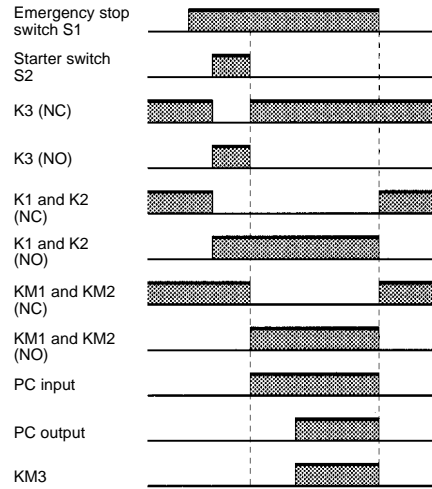


- S1: Limit switch
- S2: Safety Limit Switch with positive opening mechanism (D4D and D4B)
- S3: Starter switch
- KM1 and KM2: Magnet Contactor
- M: 3-phase motor

**■ G9S-301 (24 VDC) WITH 2-CHANNEL EMERGENCY STOP SWITCH INPUT**

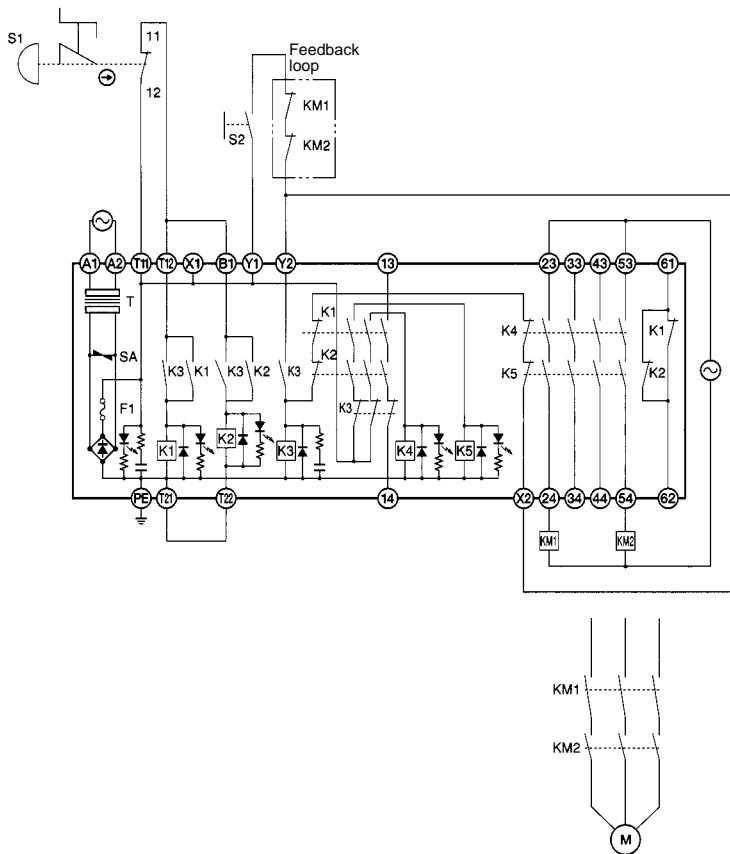


**Timing Chart**

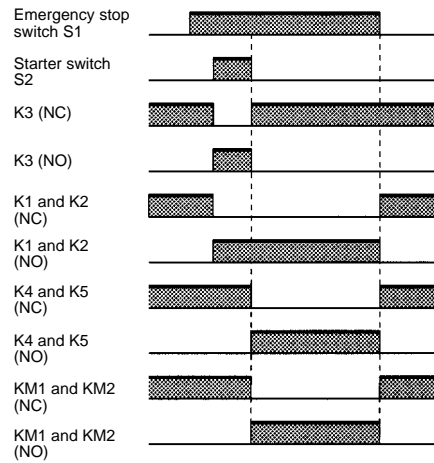


S1: Emergency stop switch  
 S2: Starter switch  
 KM1 and KM2: Magnet Contactor  
 KM3: G3J Solid-state Contactor  
 M: 3-phase motor

**■ G9S-501 (AC) WITH SINGLE-CHANNEL EMERGENCY STOP SWITCH INPUT**

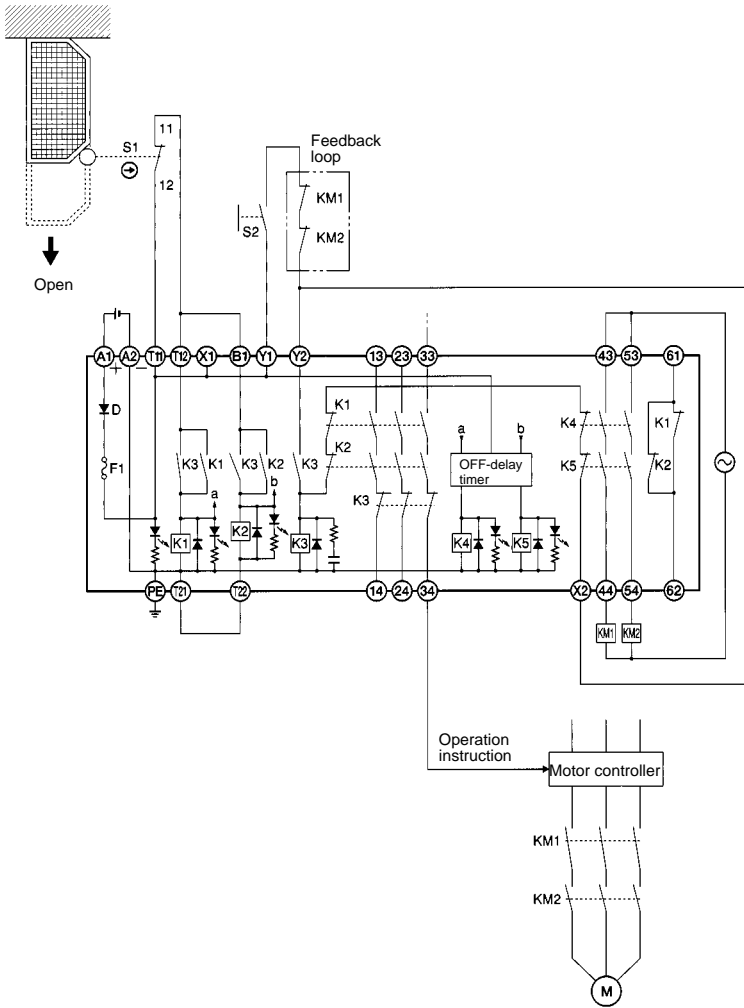


**Timing Chart**

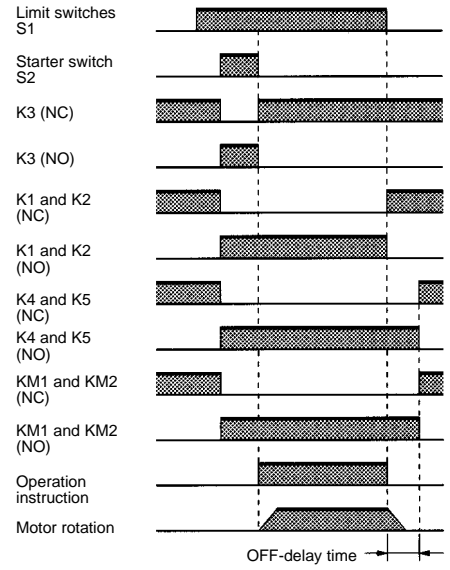


S1: Emergency stop switch  
 S2: Starter switch  
 KM1 and KM2: Magnet Contactor  
 M: 3-phase motor

■ G9S-321-T ■ (24 VDC) WITH SINGLE-CHANNEL LIMIT SWITCH INPUT

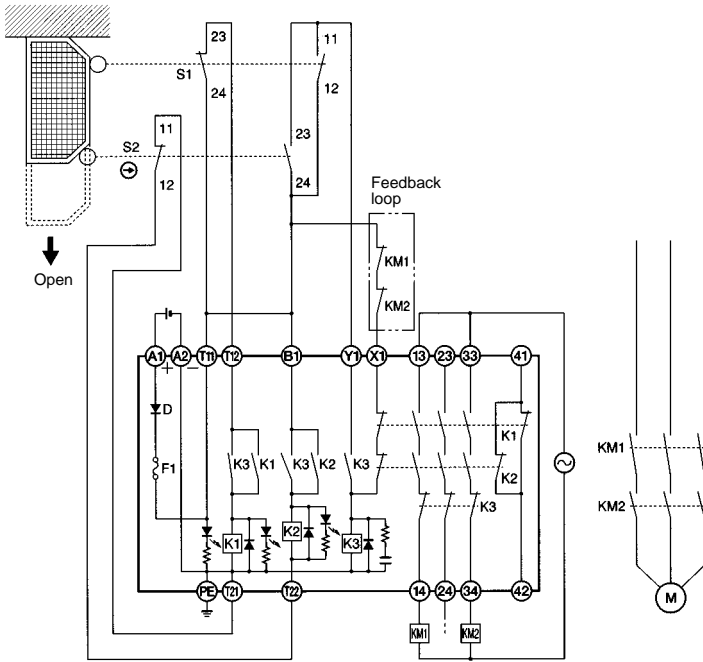


Timing Chart

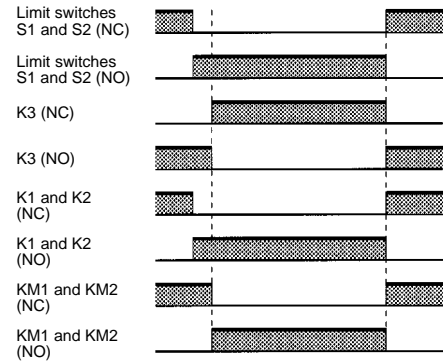


- S1: Safety Limit Switch with positive opening mechanism (D4D and D4B)
- S2: Starter switch
- KM1 and KM2: Magnet Contactor
- M: 3-phase motor

**G9S-301 (24 VDC) WITH 2-CHANNEL AUTO-RESET LIMIT SWITCH INPUT**



**Timing Chart**

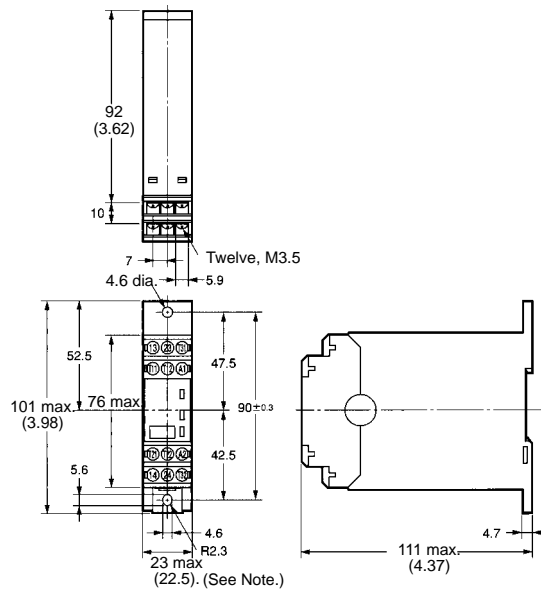
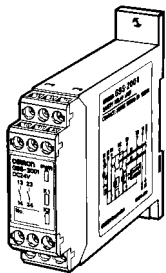


S1: Limit switch  
 S2: Safety Limit Switch with positive opening mechanism (D4D and D4B)  
 KM1 and KM2: Magnet Contactor  
 M: 3-phase motor

**Dimensions**

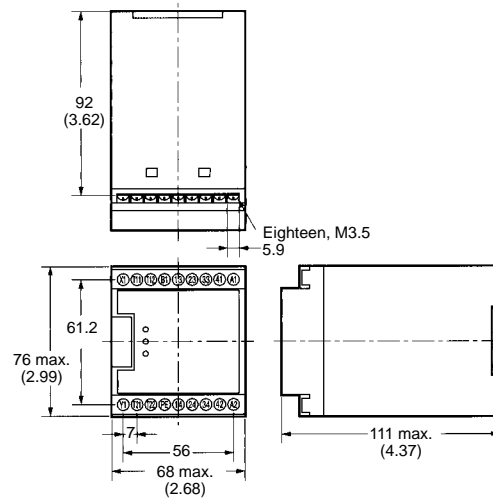
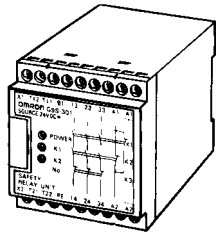
Unit: mm (inch)

**G9S-2001  
 G9S-2002**

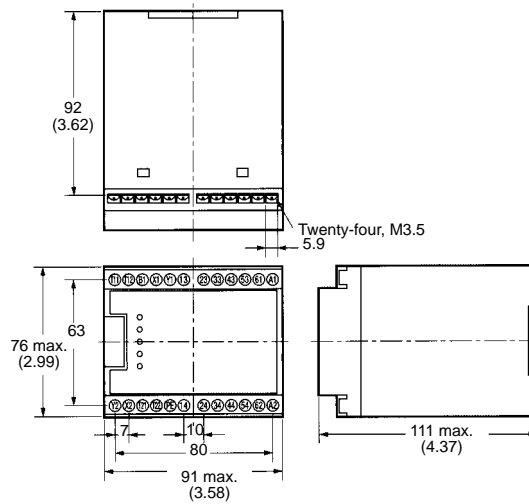
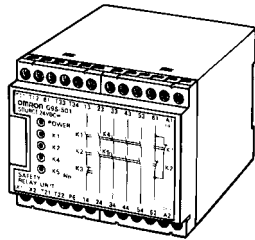


Note: This is an average value

■ G9S-301



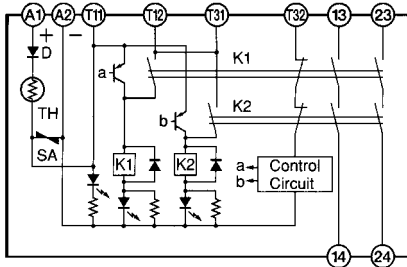
■ G9S-321-T □  
G9S-501



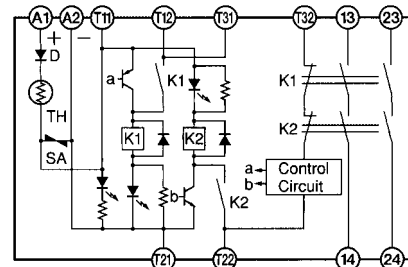
# Installation

## INTERNAL CONNECTIONS

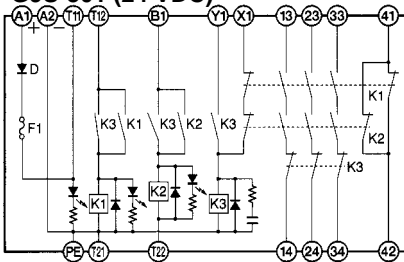
**G9S-2001**



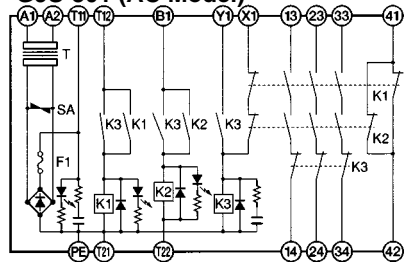
**G9S-2002**



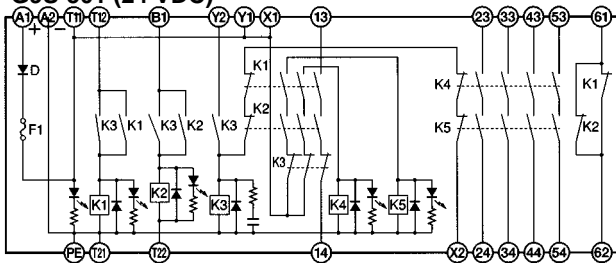
**G9S-301 (24 VDC)**



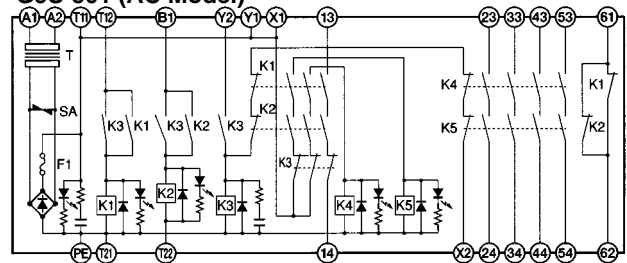
**G9S-301 (AC Model)**



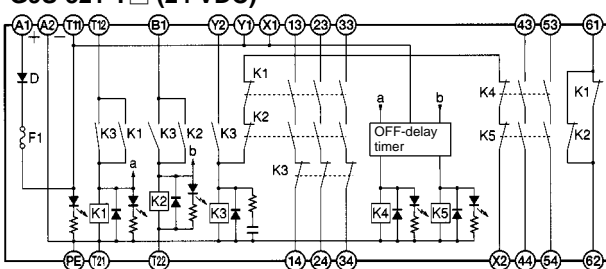
**G9S-501 (24 VDC)**



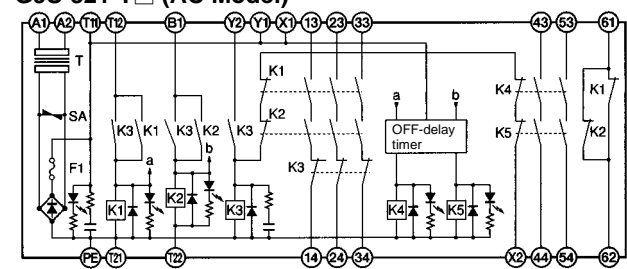
**G9S-501 (AC Model)**



**G9S-321-T□ (24 VDC)**



**G9S-321-T□ (AC Model)**



## Precautions

### ■ WIRING

Be sure to turn off the G9S before wiring the G9S. Do not touch the terminals of the G9S while the power is turned on because the terminals are charged and may cause an electric shock.

Use the following to wire the G9S.

Strand wire: 0.75 to 1.5 mm<sup>2</sup> 16 to 18 AWG

Steel wire: 1.0 to 1.5 mm<sup>2</sup> 16 to 18 AWG

Tighten each screw to a torque of 0.78 to 1.18 N•m (8 to 12 kgf•cm), or the G9S may malfunction or generate heat.

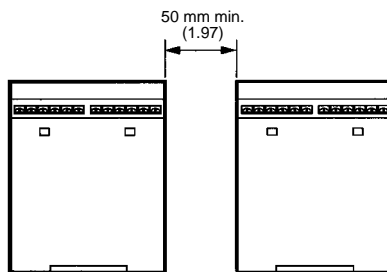
External inputs connected to T11 and T12 or T21 and T22 of the G9S-301 must be no-voltage contact inputs.

PE is a ground terminal.

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

### ■ MOUNTING MULTIPLE UNITS

If the output current is 3 A or more, make sure that there is a minimum distance of 50 mm (1.97 in) each between all adjacent G9S Units. (24-VDC models do not require this spacing.)



### ■ FUSE REPLACEMENT

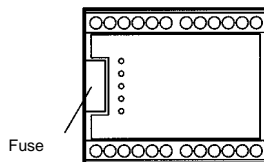
#### Three- and Five-pole Models

The power input circuit of the G9S includes a fuse to protect the G9S from damage that may be caused by short-circuiting. The fuse is mounted to the side panel. Use the following type of fuse as a replacement.

Littell Fuse 218.4 (rated current 0.4 A), IEC127 approval.

Use a flat-blade screwdriver to remove the fuse cover.

Be sure to turn off the G9S before replacing the fuse.



### ■ APPLICABLE SAFETY CATEGORY (EN954-1)

All G9S-series Relays fall under Safety Category 4 of EN954-1 except the G9S-321-T and G9S-2001. The G9S-321-T has an OFF-delay output block falling under Safety Category 3 and G9S-2001 falls under Safety Category 1.

The above is provided according to circuit examples presented by OMRON. Therefore, the above may not apply to all operating environments.

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

Wire the G9S-2001 or G9S-2002 for auto-reset. If either one of them is connected to a manual-reset switch, EN954-1 requirements will not apply.

#### Safety Category 4 of EN954-1

Wire the G9S-2001 or G9S-2002 for auto-reset. If either one of them is connected to a manual-reset switch, EN954-1 requirements will not apply.

Apply 2-channel external input to the T11 and T12 terminals and T21 and T22 terminals through switches each incorporating a force-separation mechanism. If limit switches are used, make sure that at least one of them incorporates a force-separation mechanism.

Refer to *Application Examples* and input a signal for the normally-closed contact of the contactor (i.e., input to X1 of the G9S-301, X2 of the G9S-501, or X2 of the G9S-321-T).

Be sure to ground the PE terminal. If the relay is operating with DC, the power supply may be grounded instead.

**NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.**

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