Safety Relay Unit
G9S

Ideal for Safety Door and Emergency Stop Switch Circuits

- Two-pole slim models that are only 22.5 mm wide, three-pole models that are only 67.5 mm wide, and five-pole models that are only 90 mm wide are available.
- OFF-delay models are available
- Incorporates LED indicators for monitoring built-in relays.
- Finger-protection construction.
- Both DIN track mounting and screw mounting possible (two-pole models)
- Conforms to EN60204-1 (IEC60204-1), EN954-1, and approved by BIA.

Note: Be sure to read the *"Safety Precautions"* on page H-53.

Ordering Information

Basic Models

Number of poles	Main contact form	Number of input channels	Model	Rated voltage
2	DPST-NO	1 channel	G9S-2001	24 VDC
		2 channels	G9S-2002	
3 (see note)	3PST-NO	1 channel or 2 channels possible	G9S-301	24 VDC
				24 VAC
				100 VAC
				120 VAC
				200 VAC
				240 VAC
5 (see note)	5PST-NO		G9S-501	24 VDC
				24 VAC
				100 VAC
				120 VAC
				200 VAC
				240 VAC

Note: Auxiliary contact is SPST-NC.

OFF-delay Models

Number of poles	Main contact form	OFF-delay form	Number of input channels	Model	OFF-delay time	Rated voltage
3	3PST-NO	DPST-NO	1 channel or 2 channels possible	G9S-321-T01, T015, T03, T04, T05, T06, T10, T30	1 s, 1.5 s, 3 s, 4 s, 5 s, 6 s, 10 s, 30 s	24 VDC
						24 VAC
						100 VAC
						120 VAC
						200 VAC
						240 VAC

Note: Each model has an SPST-NC auxiliary contact.
When ordering specify the voltage.
Example: G9S-2001 24 VDC
Rated voltage

Model Number Structure

■ Model Number Legend

G9S-□□□□-□□□
1 2 3 4 5

1. Contact Configuration (Safety Output)
- 2: DPST-ND
- 3: 3PST-NO
- 5: 5PST-NO

2. Contact Configuration (OFF-delay Output)
- 0: None
- 2: DPST-ND

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

4. Input Configuration
- None: 1-channel or 2-channel input possible
- 1: 1-channel input
- 2: 2-channel input

5. OFF-delay Time
- None: No OFF-delay
- T01: 1 second
- T015: 1.5 seconds
- T03: 3 seconds
- T04: 4 seconds
- T05: 5 seconds
- T06: 6 seconds
- T10: 10 seconds
- T30: 30 seconds

Specifications

■ Ratings

Controller Block

Model	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)
	100 VAC	30 mA±20%	
	120 VAC	25 mA±20%	
	200 VAC	15 mA±20%	
	240 VAC	12.5 mA±20%	
G9S-501	24 VDC	127 mA±20%	Approx. 3 W
	24 VAC	229 mA±20%	Approx. 5.5 VA (60 Hz)
	100 VAC	55 mA±20%	
	120 VAC	45.8 mA±20%	
	200 VAC	27.5 mA±20%	
	240 VAC	22.9 mA±20%	
G9S-321-T□	24 VDC	150 mA±20%	Approx. 3.6 W
	24 VAC	254 mA±20%	Approx. 6.1 VA (60 Hz)
	100 VAC	61 mA±20%	
	120 VAC	50.8 mA±20%	
	200 VAC	30.5 mA±20%	
	240 VAC	25.4 mA±20%	

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

Contact

Item \ Model	G9S-301, G9S-501, G9S-321-T□		G9S-2001, G9S-2002	
Item / Load	Resistive load	Inductive load	Resistive load	Inductive load
Rated load	240 VAC, 3 A 24 VDC, 3 A (see note)	240 VAC, 3 A (cosϕ = 0.3) 24 VDC, 1 A (L/R=100 ms)	240 VAC, 5 A 24 VDC, 5 A	240 VAC, 3 A (cosϕ = 0.3) 24 VDC, 1 A (L/R=100 ms)
Rated carry current	5 A			

Note: If the load is 5 A at 240 VAC, the durability will be 40,000 operations.

■ Characteristics

Item	Model	G9S-2001	G9S-2002	G9S-301	G9S-501	G9S-321-T□
Operating time (see note 1)		50 ms max.		300 ms max.		
Response time (see note 1, 2)		50 ms max.		100 ms max.		
Control circuit power supply voltage allowance		–15% to +10%				
Insulation resistance (at 500 VDC)	Between control circuits and safety/auxiliary circuits	100 Ω min.				
	Between safety circuits and auxiliary circuits	100 Ω min.				
	Safety circuits	100 Ω min.				
Dielectric strength	Between control circuits and safety/auxiliary circuits	2,500 VAC (50/60 Hz, 1 min.)				
	Between safety circuits and auxiliary circuits	2,500 VAC (50/60 Hz, 1 min.)				
	Safety circuits	2,500 VAC (50/60 Hz, 1 min.)				
Vibration resistance	Destruction	10 to 55 to 10 Hz, 0.375-mm single amplitude (0.75-mm double amplitude)				
	Malfunction	10 to 55 to 10 Hz, 0.25-mm single amplitude (0.5-mm double amplitude)				
Shock resistance	Destruction	300 m/s^2				
	Malfunction	50 m/s^2				
Min. permissible load, p-level (reference value)		24 VDC, 50 mA				
Ambient operating temperature		–25°C to 55°C (with no icing or condensation)				
Ambient operating humidity		35% to 85%				
Terminal tightening torque		0.98 N·m				
Weight (see note 3)		Approx. 180 g	Approx. 180 g	Approx. 365 g	Approx. 550 g	Approx. 580 g

Note: 1. The operating time and response time include bounce.
2. The response time is the time it takes for the main contact to open after the input is turned OFF.
3. These weights are for DC models. AC models are 200 g heavier.

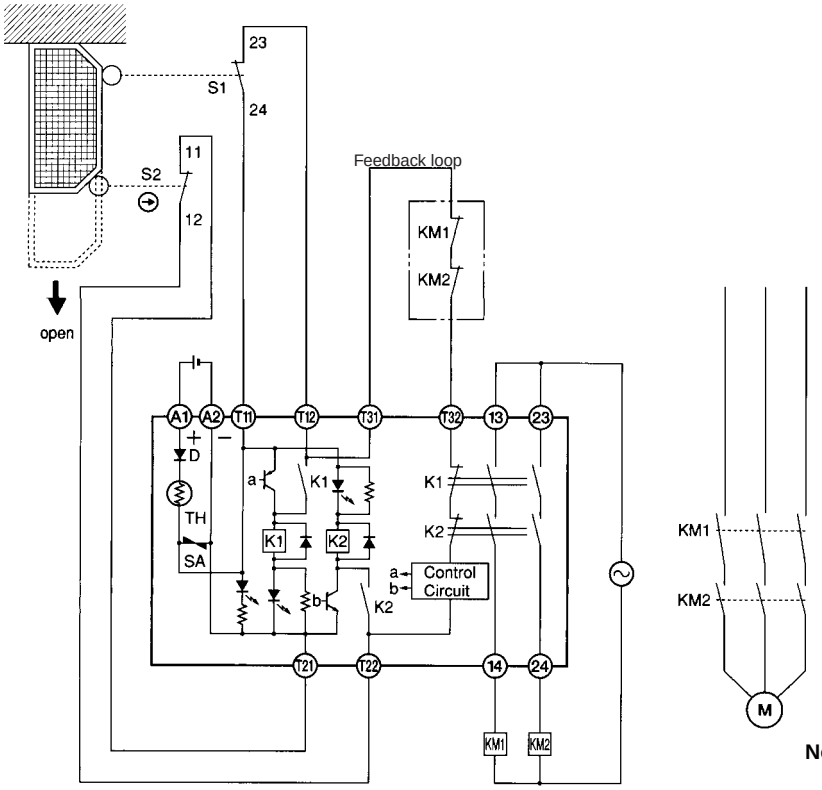
■ Durability

Mechanical durability	1,000,000 operations min. with a switching frequency of approx. 1,800 operations/h
Electrical durability	100,000 operations min. at the rated load with a switching frequency of approx. 1,800 operations/h

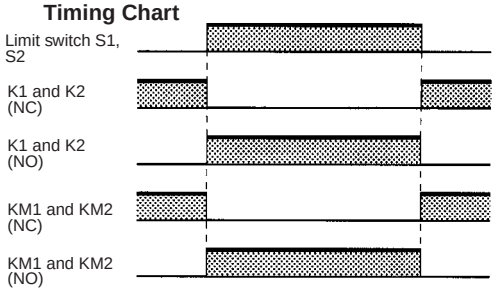
Note: The durability is for an ambient temperature of 15°C to 35°C and an ambient humidity of 25% to 75%.

Application Examples

G9S-2002 with 2-channel Auto-reset Limit Switch Input



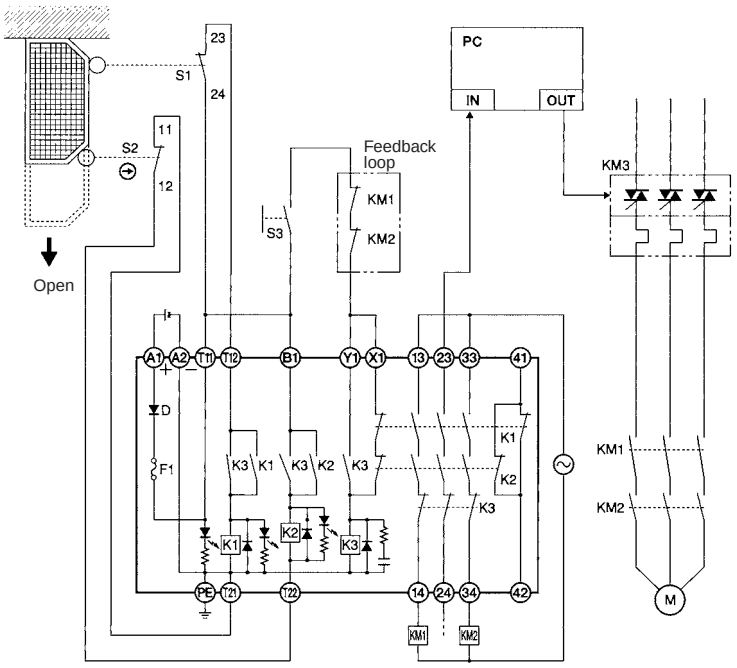
Timing Chart



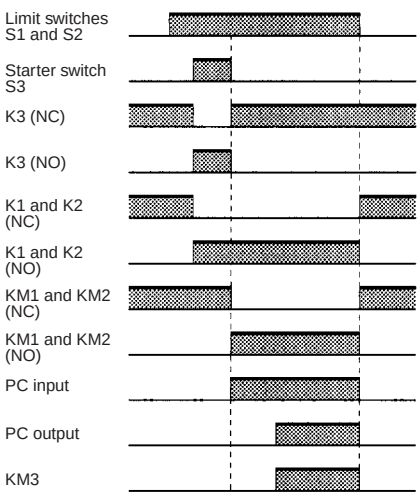
S1: Limit switch (NO)
S2: Safety Limit Switch with positive opening mechanism (NC) (D4B-N, D4N, D4F) ⊕
KM1 and KM2: Magnet Contactor
M: 3-phase motor

Note: This circuit conforms to EN954-1 Safety Category 4.

G9S301 (24 VDC) with 2channel Limit Switch Input/Manual Reset



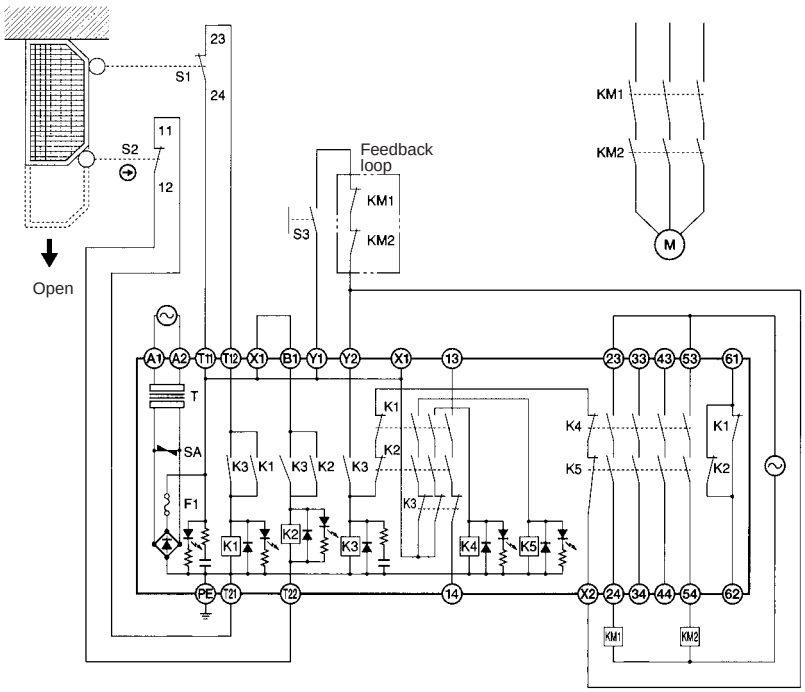
Timing Chart



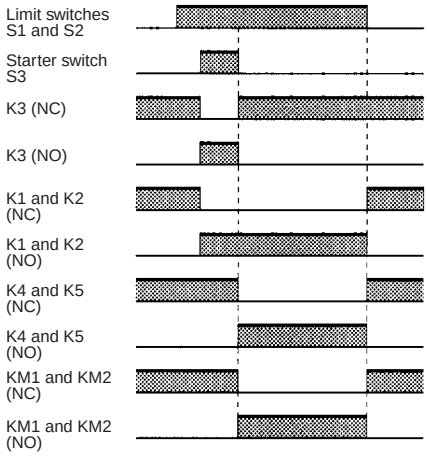
S1: Limit switch (NO)
S2: Safety Limit Switch with positive opening mechanism (NC) (D4B-N, D4N, D4F) ⊕
S3: Reset switch (momentary operation)
KM1 and KM2: Magnet Contactor
KM3: G3J Solid-state Contactor
M: 3-phase motor

Note: This circuit conforms to EN954-1 Safety Category 4.

G9S-501 (AC Model) with 2-channel Limit Switch Input/Manual Reset



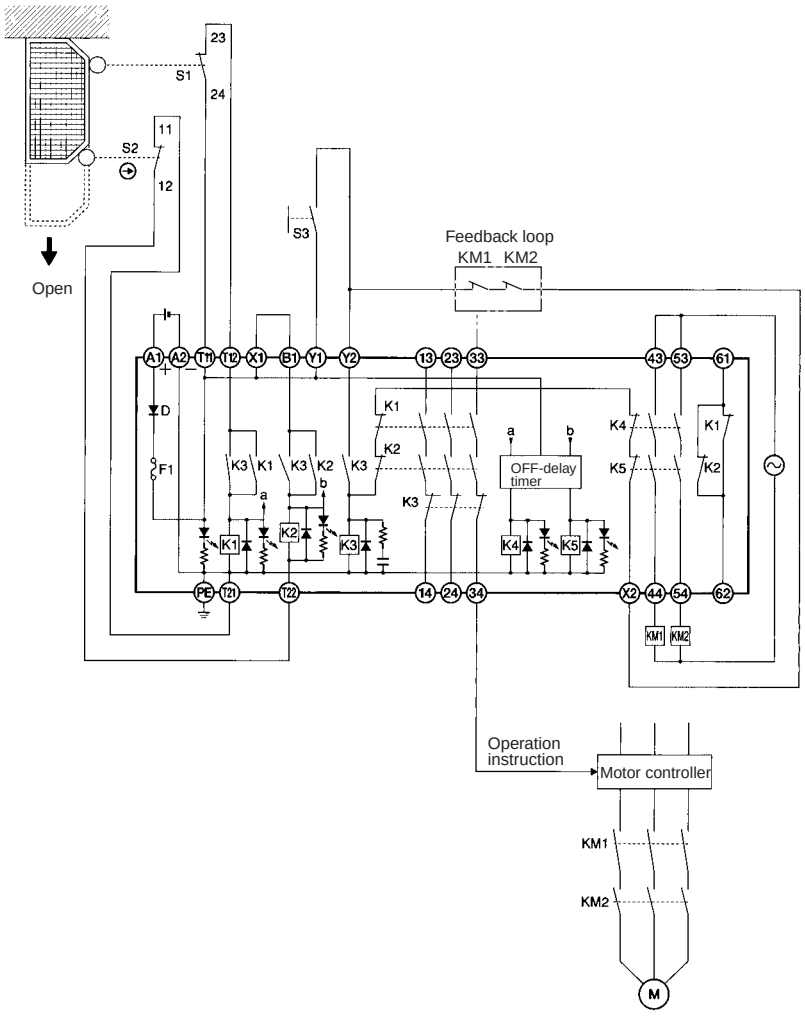
Timing Chart



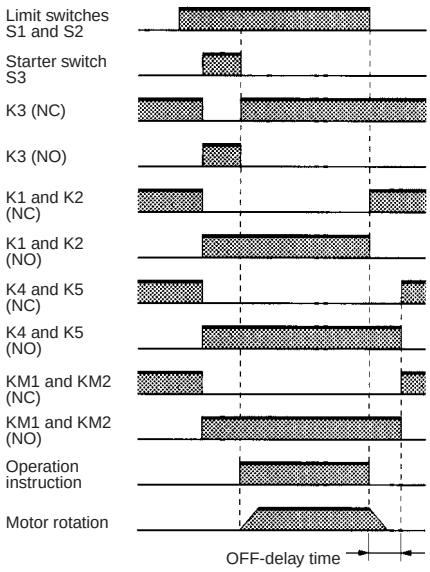
S1: Limit switch (NO)
S2: Safety Limit Switch with positive opening mechanism (NC) (D4B-N, D4N, D4F) ⊕
S3: Reset switch (momentary operation)
KM1 and KM2: Magnet Contactor
M: 3-phase motor

Note: This circuit conforms to EN954-1 Safety Category 4.

G9S-321T□ (24 VDC) with 2-channel Limit Switch Input/Manual Reset



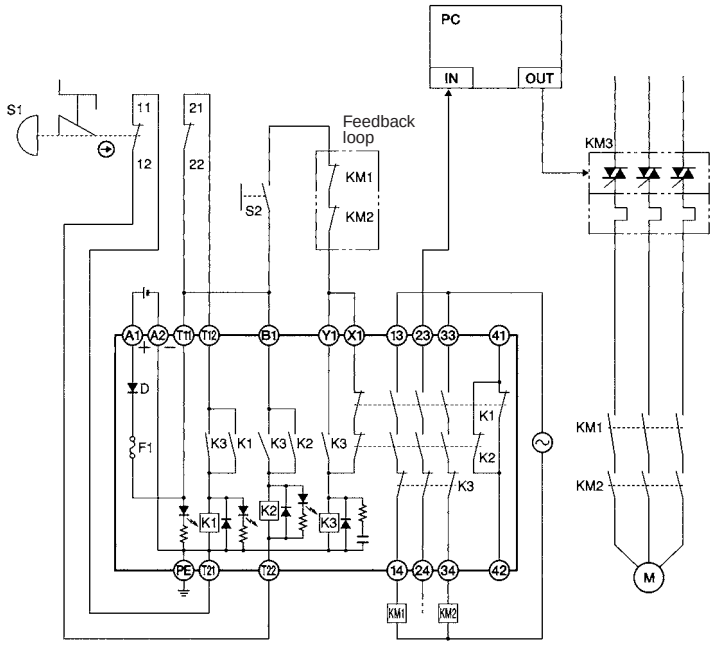
Timing Chart



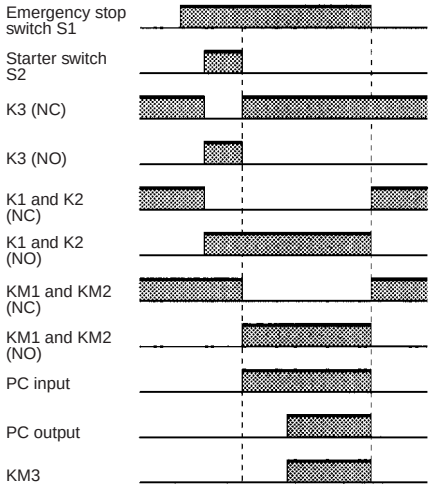
S1: Limit switch (NO)
S2: Safety Limit Switch with positive opening mechanism (NC) (D4B-N, D4N, D4F) ⊕
S3: Reset switch (momentary operation)
KM1 and KM2: Magnet Contactor
M: 3-phase motor

Note: This circuit conforms to EN954-1 Safety Category 4 except for the OFF-delay output sections, which conforms to Category 3.

G9S-301 (24 VDC) with 2-channel Emergency Stop Switch Input/Manual Reset



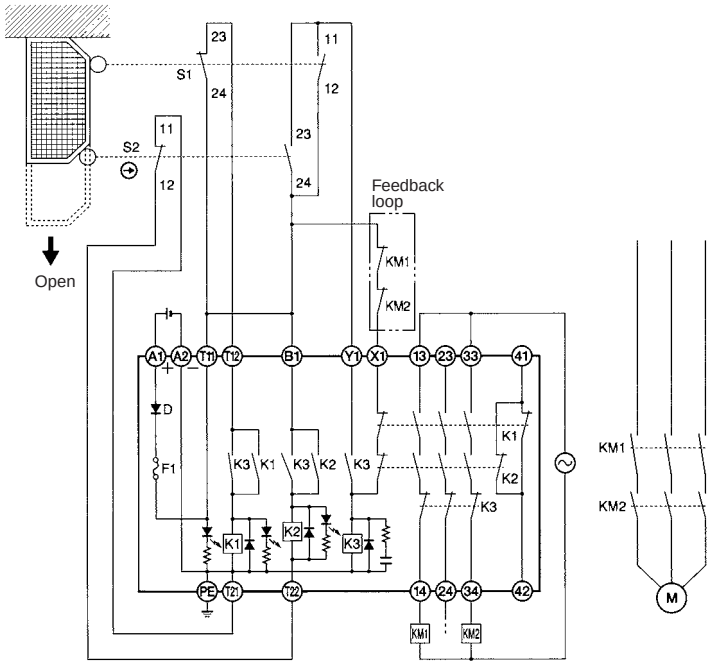
Timing Chart



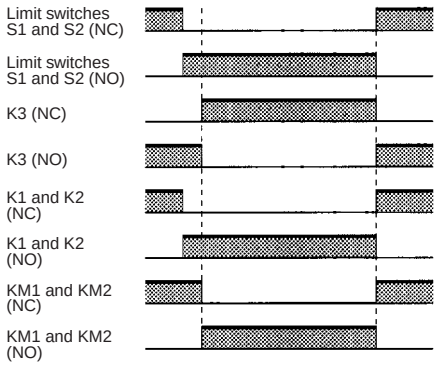
S1: Emergency stop switch ⊕
S2: Reset switch (momentary operation)
KM1 and KM2: Magnet Contactor
KM3: G3J Solid-state Contactor
M: 3-phase motor

Note: This circuit conforms to EN954-1 Safety Category 4.

G9S-301 (24 VDC) with 2-channel Auto-reset Limit Switch Input



Timing Chart



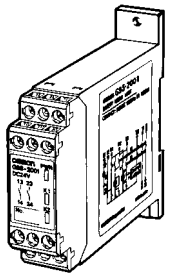
S1: Limit switch (NO)
S2: Safety Limit Switch with positive opening mechanism (NC) (D4B-N, D4N, D4F) ⊕
KM1 and KM2: Magnet Contactor
M: 3-phase motor

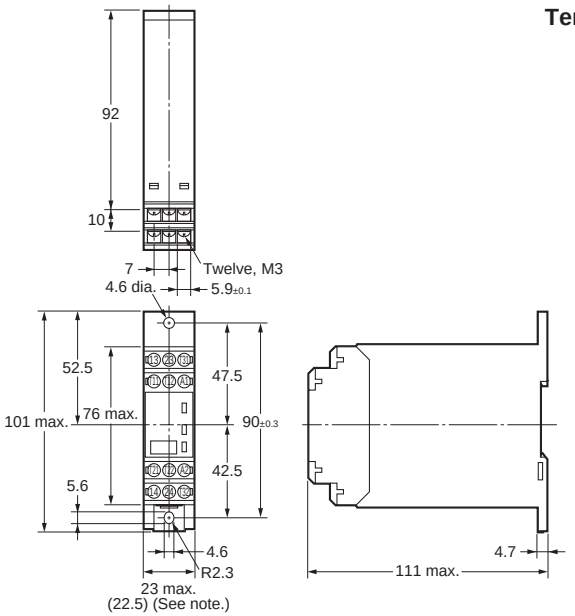
Note: This circuit conforms to EN954-1 Safety Category 4.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

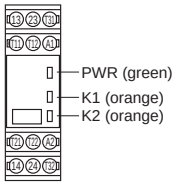
G9S-2001
G9S-2002





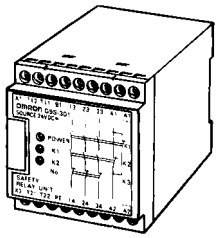
Terminal Arrangement

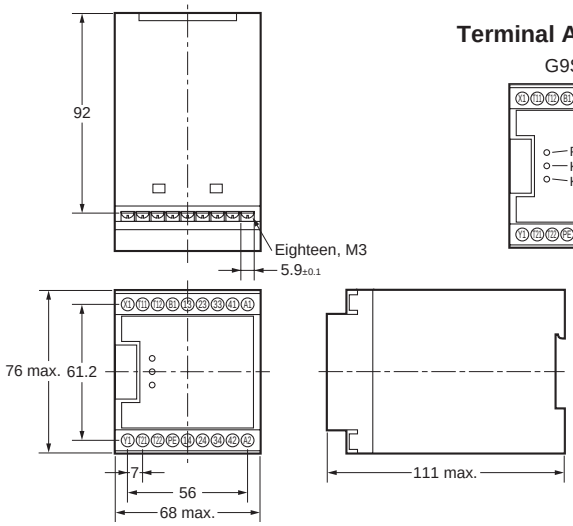
G9S-2001
G9S-2002



Note: This is an average value.

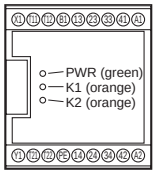
G9S-301



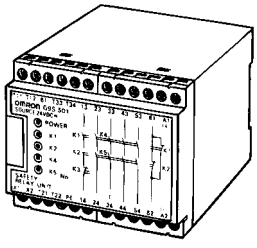


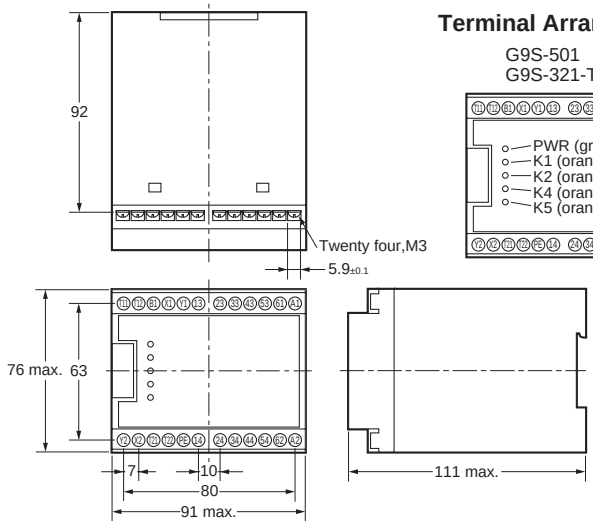
Terminal Arrangement

G9S-301



G9S-321-T□
G9S-501





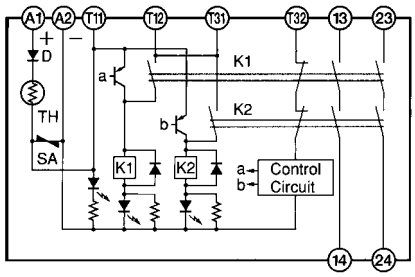
Terminal Arrangement

G9S-501
G9S-321-T□

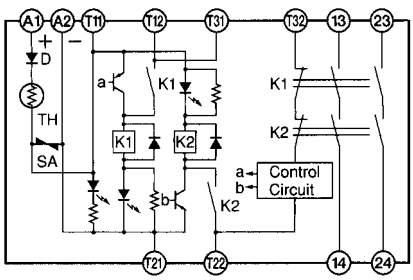
Installation

■ Internal Connections

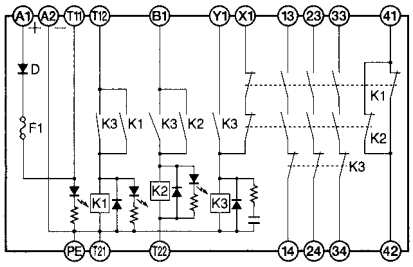
G9S-2001



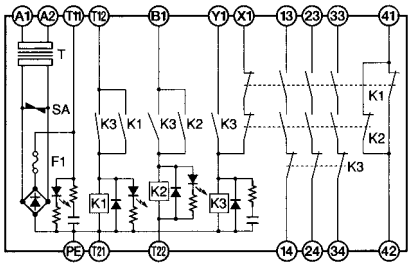
G9S-2002



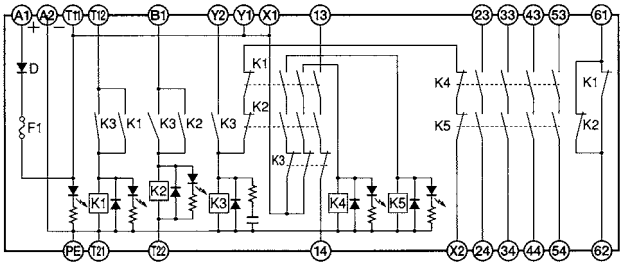
G9S-301 (24 VDC)



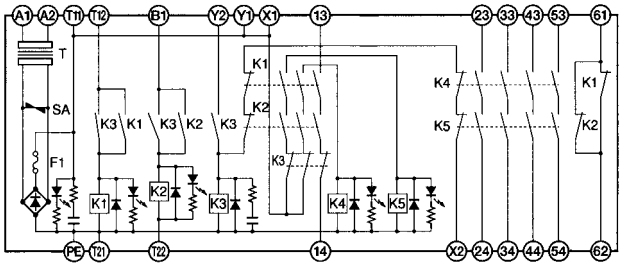
G9S-301 (AC Model)



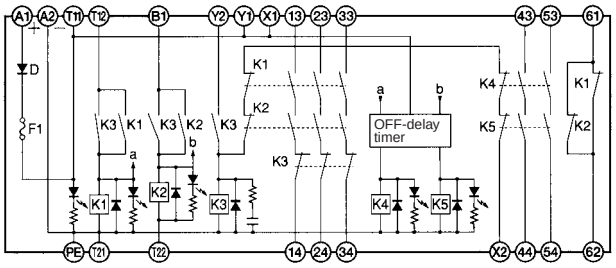
G9S-501 (24 VDC)



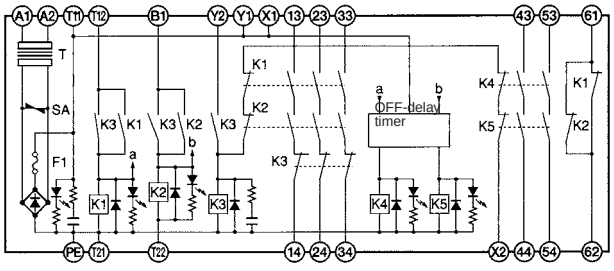
G9S-501 (AC Model)



G9S-321-T□ (24 VDC)



G9S-321-T□ (AC Model)



Safety Precautions

Refer to the *"Precautions for All Relays"* on page I-9 and *"Precautions for All Relays with Forcibly Guided Contacts"* on page G-2.

⚠ WARNING

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.

■ Precautions for Correct Use

Installation

The G9S should be installed perpendicular on a vertical surface (i.e., vertically so that the markings can be read).

Wiring

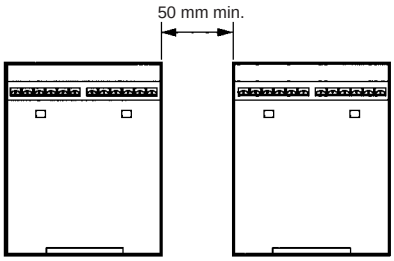
Use the following to wire the G9S.
Stranded wire: 0.75 to 1.5 mm^2
Steel wire: 1.0 to 1.5 mm^2

Make sure that each screw is tightened to a torque of 0.78 to 1.18 N·m, 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.

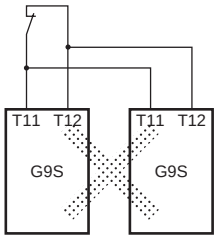
Mounting Multiple Units

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



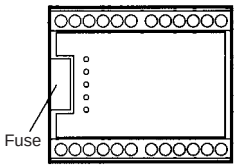
Connecting Inputs

When using more than one G9S Unit, do not connect the same switch to more than one G9S Unit. This applies to all input terminals.



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.
Littel 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-32I-T and G9S-2001. The G9S-32I-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-2002 for auto-reset. If it 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.

■ Approved Standards

The G9S-301, G9S-501, G9S-321T, G9S-2001 and G9S-2002 conform to the following standards.

- EN standards, certified by BIA:
  EN954-1
  EN60204-1
- Conformance to EMC (Electromagnetic Compatibility), certified by TÜV Product Service:
  EMI (Emission): EN55011 Group 1 Class A
  EMS (Immunity): EN61000-6-2
- UL standards: UL508 (Industrial Control Equipment)
- CSA standards: CSA C22.2 No. 14 (Industrial Control Equipment)

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. J109-E1-04

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