

Two-Hand Controller

45-mm Wide Two-Hand Control Circuit

- Two-Hand Controller, easy-to-connect
Expansion Units available
- Positive, force-guided contacts
- DIN-rail or panel-mountable



Ordering Information

Item	Main contacts	Auxiliary contact	OFF-delay contacts	Number of input channels	OFF-delay time	EN954-1 Safety Category	Part number
Two-hand controller	3PST-NO	SPST-NC	—	1 or 2	—	4	G9SA-TH301
Expansion unit	3PST-NO	SPST-NC	—	—	—	4	G9SA-EX301
Expansion unit with OFF-delay timer	—	SPST-NC	3PST-NO	—	7.5 s	3	G9SA-EX031-T075
					15 s	3	G9SA-EX031-T15
					30 s	3	G9SA-EX031-T30

Specifications

■ RATINGS

Power Input

Item	G9SA-TH301
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 (See note.)	24 VAC/VDC: 1.8 VA/1.7 W max. 100 to 240 VAC: 9 VA max.

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

■ INPUTS

Item	G9SA-TH301
Input current (See note.)	40 mA max.

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

■ CONTACTS

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

Note: When multiple Units are mounted close together, the rated current will be 3 A.

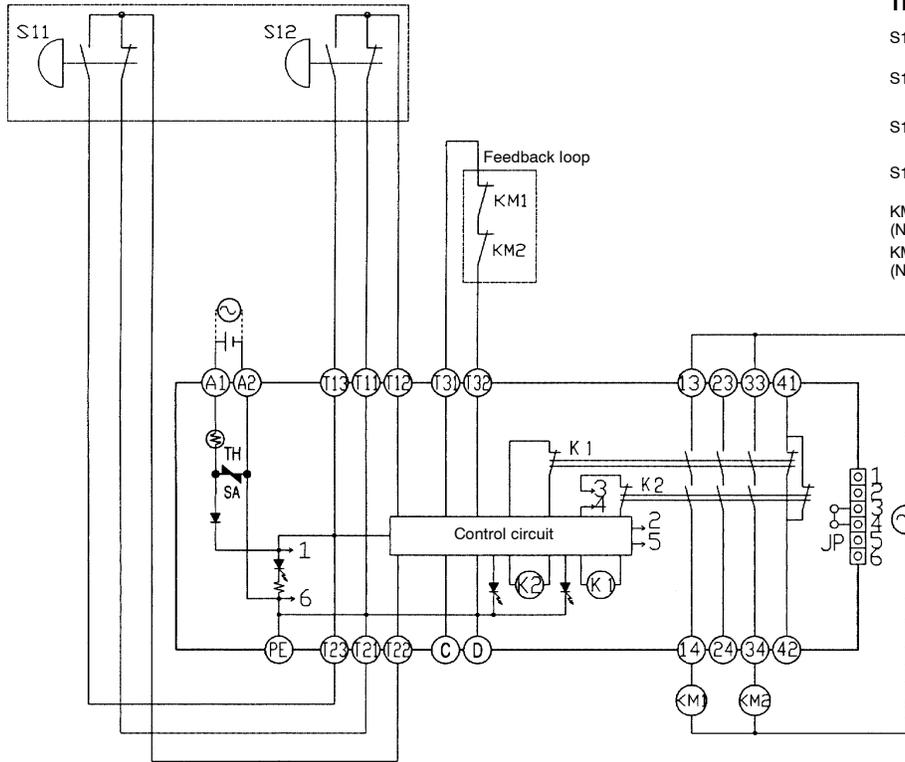
■ CHARACTERISTICS

Item	G9SA-TH301	G9SA-EX301/EX031-T□
Contact resistance (See Note 1)	100 mΩ	
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 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 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)
Minimum permissible load (reference value)	5 VDC, 1 mA	
Ambient temperature	Operating: -25°C to 55°C (with no icing or condensation) Storage: -25°C to 85°C (with no icing or condensation)	
Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%	
Terminal tightening torque	0.98 N•m	
Weight (See Note 4)	Approx. 210	Approx. 130 g
Approved standards	EN954-1, EN60204-1, EN574 (-TH301), UL508, CSA C22.2 No. 14	
EMC	EMI: EN55011 group 1 class A EMS: EN50082-2 group 1	

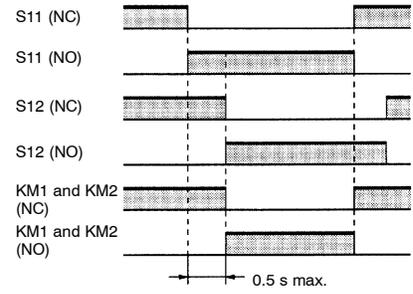
- Note: 1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.
 2. The response time is the time it takes for the main contact to open after the input is turned OFF.
 3. The insulation resistance was measured with 500 VDC at the same places that the dielectric strength was checked.
 4. Weight shown is for 24-VAC/VDC type. For 100 to 240-VAC type, add approximately 20 g.

Application Examples

■ G9SA-TH301 (24 VDC) WITH 2-HAND INPUTS/AUTO-RESET



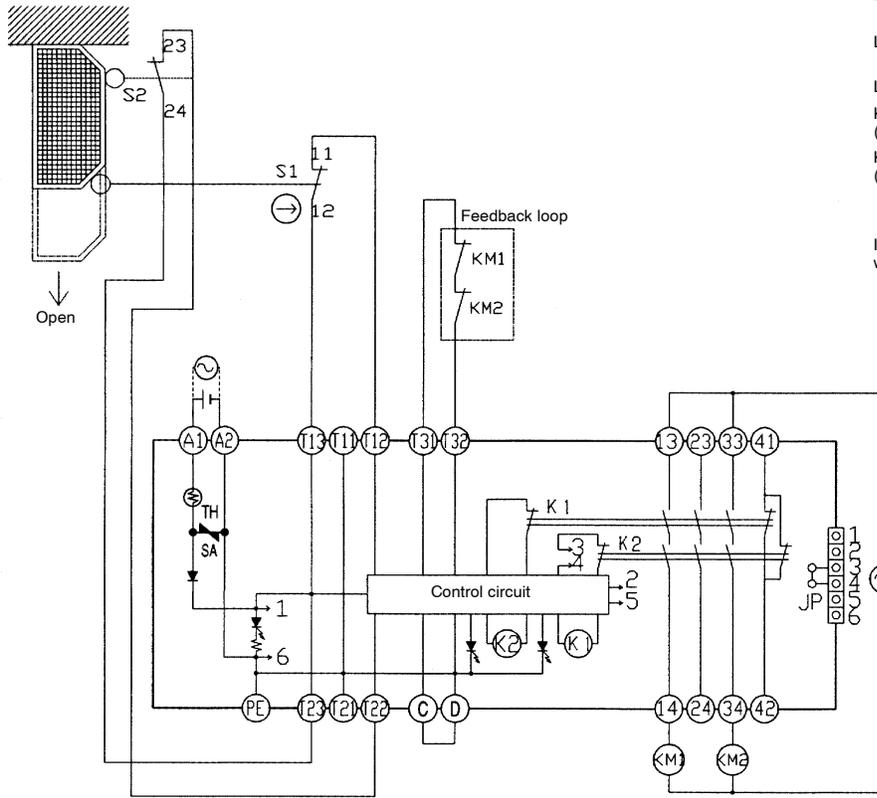
Timing Chart



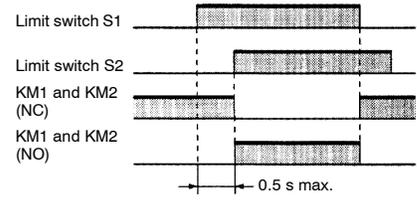
Input time difference operates only when the difference is 0.5 s max.

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

■ G9SA-TH301 (24 VAC/VDC) WITH 2-CHANNEL LIMIT SWITCH INPUT/TIME DELAY CHECK BETWEEN CHANNELS/AUTO-RESET



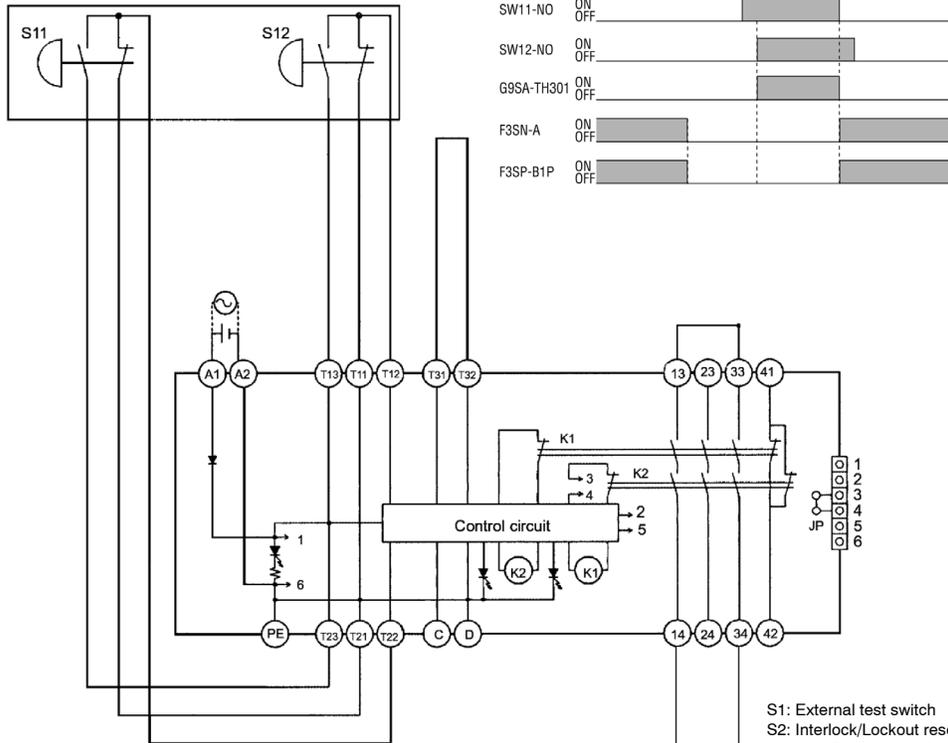
Timing Chart



Input time difference operates only when the difference is 0.5 s max.

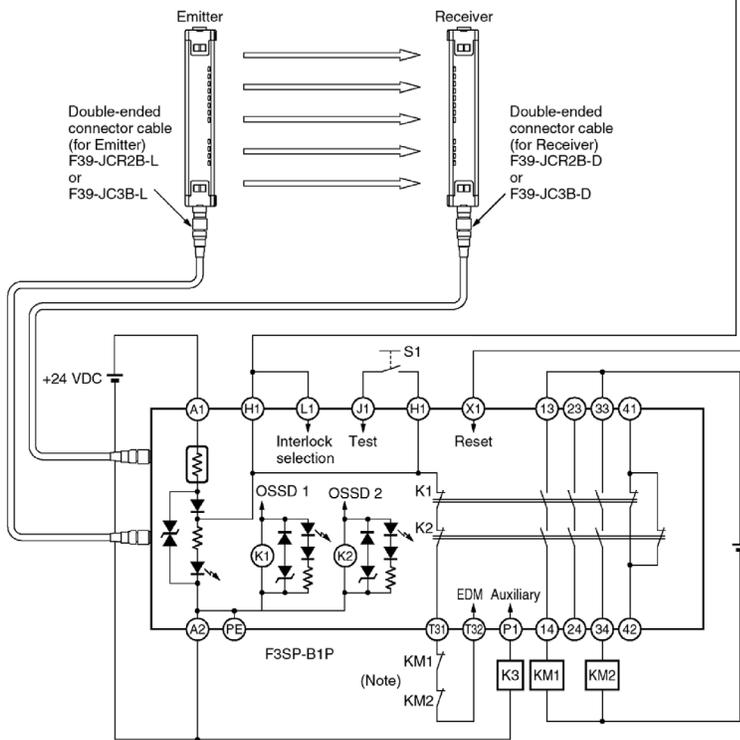
- S1: Safety Limit Switch with positive opening mechanism (D4D or D4B) ⊕
- S2: Limit switch
- KM1 and KM2: Magnetic Contactor

■ G9SA-TH301 (24 VAC/VDC) WITH 2-CHANNEL PUSH BUTTON INPUT/TIME DELAY CHECK BETWEEN CHANNELS/MANUAL-RESET — WITH SAFETY LIGHT CURTAIN



S1: External test switch
S2: Interlock/Lockout reset switch
KM1, KM2: Relays that control the dangerous zone, etc.
K3: Load, PLC, etc.: used for monitoring.

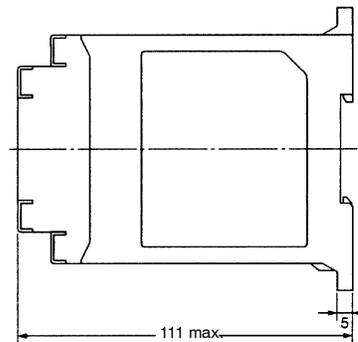
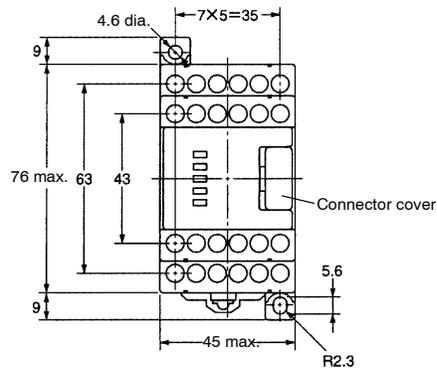
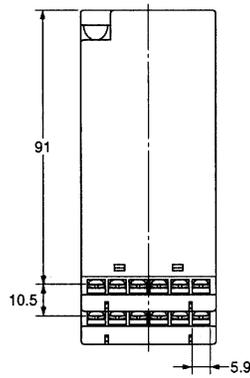
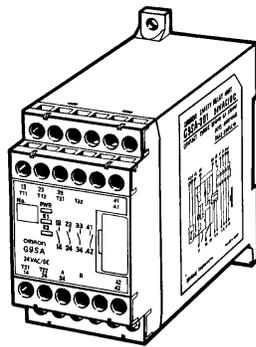
Note: If the EDM is not necessary, short-circuit T31 and T32.



Dimensions

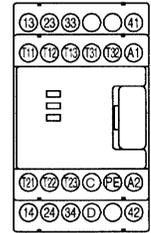
Unit: mm

■ G9SA-TH301



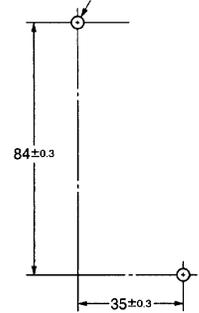
Terminal Arrangement

G9SA-TH301

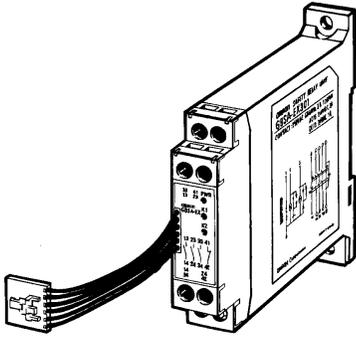


Mounting Holes

Two, 4.2 dia. or M4

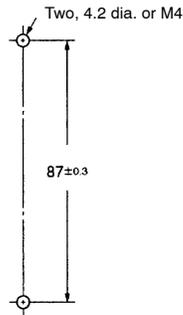


■ G9SA-EX301
G9SA-EX031-T□



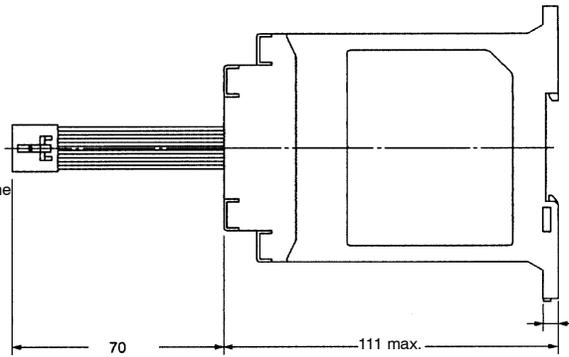
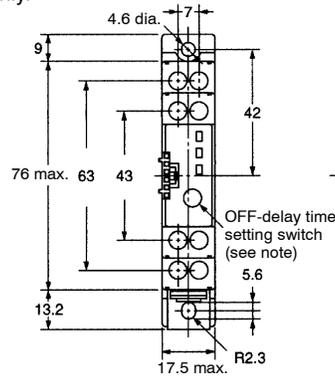
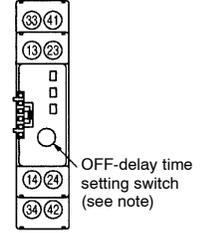
Note: The OFF-delay time setting switch is found on the G9SA-EX031-T□ only.

Mounting Holes



Terminal Arrangement

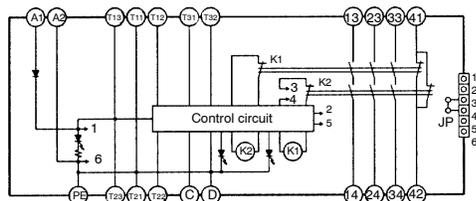
G9SA-EX301
G9SA-EX031-T□



Installation

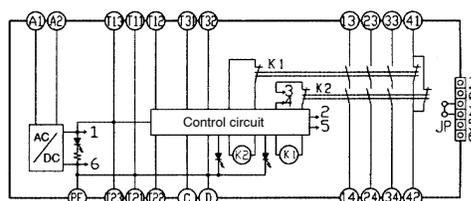
Internal Connections

G9SA-TH301 (24 VAC/VDC)



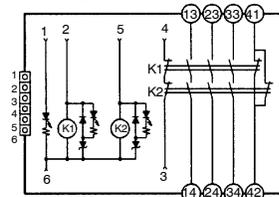
(See note 1.)

G9SA-TH301 (100 to 240 VAC)

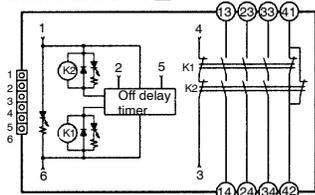


(See note 1.)

G9SA-EX301



G9SA-EX031-T□



- Note: 1. Use terminals C and D to switch input conditions.
 C to D open: DPDT input.
 C to D closed: DPST-NC input.
 (Make sure T11 and T21 are open.)
2. With 100 to 240-VAC type, be sure to connect PE to a protective ground. With 24-VAC/VDC type, if the power supply is not connected to a protective ground, be sure to connect PE to a protective ground.
3. With 24-VAC/VDC type, the power supply terminals A1 and A2 have polarities. A2 is the negative pole.

Precautions

WIRING

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

Use the following to wire the G9SA-TH.
 Stranded wire: 0.75 to 1.5 mm², 16 to 18 AWG
 Solid wire: 1.0 to 1.5 mm², 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 G9SA-TH 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-TH before connecting the Expansion Unit.

When an Expansion Unit is being used, remove the connector cover from the G9SA-TH301 Safety Relay Unit and insert the connector of the Expansion Unit's connector cable.

APPLICABLE SAFETY CATEGORY (EN954-1)

All G9SA-TH-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 OFF-delay output of model EX031-T□, however, conforms to Safety Category 3.

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.

EARTH SHORT

A positive thermistor is built into the G9SA-TH circuits, so you can detect earth short breakdowns and breakdown shorts between channel 1 and channel 2. If the short breakdown is canceled, reset is automatic.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters into inches, divide by 25.4



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