

# Safety Relay Unit

# G9SA

CSM\_G9SA\_DS\_E\_11\_15

## Proven and popular safety relay units

## Output expansion, DC power supply, and AC power supply models

- 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 ISO13849-1 (PLe/Safety Category 4) \*.
- Both DIN track mounting and screw mounting are possible.

\* Except for some models.

Refer to "Applicable Performance Level (PL)" on page 13, or "Reliability data for safety of control components\_SISTEMA library" on OMRON's website.

 Be sure to read the "Safety Precautions" on page 15



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

## Model Number Structure

### 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  
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

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

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

**Note:** 1. Please see "Ordering Information" on page 2 for the actual models that can be ordered.  
2. Specify the power supply voltage when ordering.

## Ordering Information

Specify the power supply voltage when ordering.

### G9SA Master Units

#### 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

### 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 or G9SA-321.

| 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

## Specifications

### Ratings

#### Power Input

| Item                    | Model | G9SA-301/TH301                                                                      | G9SA-501                                                    | G9SA-321-T□                                                   |
|-------------------------|-------|-------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------|
| Power supply voltage    |       | 24 VAC/VDC: 24 VAC, 50/60 Hz, or 24 VDC<br>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: 5.7 VA/1.7 W max.<br>100 to 240 VAC: 9 VA max.                          | 24 VAC/VDC: 7.4 VA/2.6 W max.<br>100 to 240 VAC: 11 VA max. | 24 VAC/VDC: 8.6 VA/3.3 W max.<br>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

| Item            | Model | 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

| Item                | Model | G9SA-301/501/321-T□/TH301/EX301/EX031-T□ |
|---------------------|-------|------------------------------------------|
|                     | Load  | Resistive load                           |
| Rated load          |       | 250 VAC, 5 A<br>30 VDC, 5 A              |
| Rated carry current |       | 5 A                                      |

### Characteristics

| Item                                     |                                  |                                   | Model | G9SA-301/TH301                                                          | G9SA-501/321-T□ | G9SA-EX301/EX031-T□ |
|------------------------------------------|----------------------------------|-----------------------------------|-------|-------------------------------------------------------------------------|-----------------|---------------------|
| Contact resistance *1                    |                                  |                                   |       | 100 mΩ                                                                  |                 |                     |
| Operating time *2                        |                                  |                                   |       | 30 ms max.                                                              |                 |                     |
| Response time *3                         |                                  |                                   |       | 10 ms max.                                                              |                 |                     |
| Isolation specification                  | Isolation voltage (Ui)           |                                   |       | 250 VAC                                                                 |                 |                     |
|                                          | Impulse withstand voltage (Uimp) |                                   |       | 4 kV                                                                    |                 |                     |
|                                          | Insulation resistance *4         | Between input and output          |       | 100 MΩ min. (at 500 VDC)                                                |                 |                     |
|                                          |                                  | Between different poles of output |       |                                                                         |                 |                     |
|                                          | Dielectric strength              | Between input and output          |       | 2,500 VAC 1min.                                                         |                 |                     |
|                                          |                                  | Between different poles of output |       |                                                                         |                 |                     |
| Vibration resistance                     |                                  |                                   |       | 10 to 55 to 10 Hz, 0.375-mm single amplitude (0.75-mm double amplitude) |                 |                     |
| Shock resistance                         | Destruction                      |                                   |       | 300 m/s <sup>2</sup>                                                    |                 |                     |
|                                          | Malfunction                      |                                   |       | 100 m/s <sup>2</sup>                                                    |                 |                     |
| 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               |                                  |                                   |       | 0.6 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.

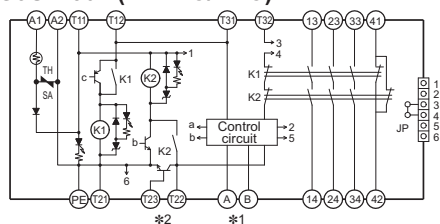
\*5. The durability is for an ambient temperature of 15 to 35°C and an ambient humidity of 25% to 75%.

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

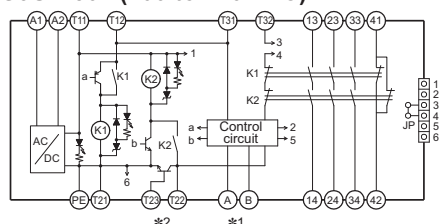
# Connections

## Internal Connections

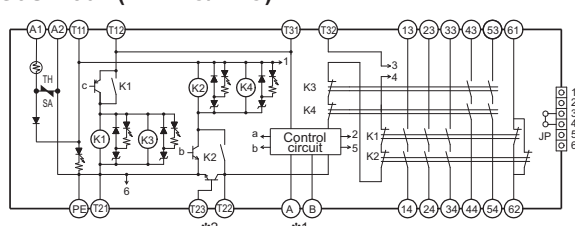
**G9SA-301 (24 VAC/VDC)**



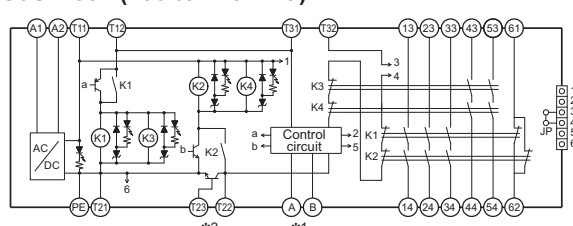
**G9SA-301 (100 to 240 VAC)**



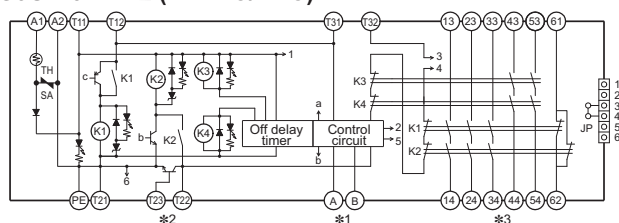
**G9SA-501 (24 VAC/VDC)**



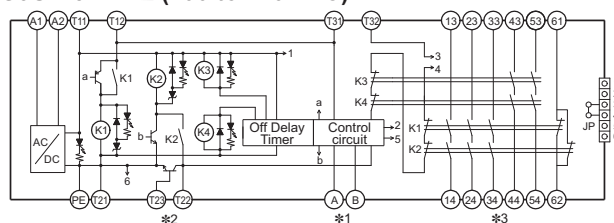
**G9SA-501 (100 to 240 VAC)**



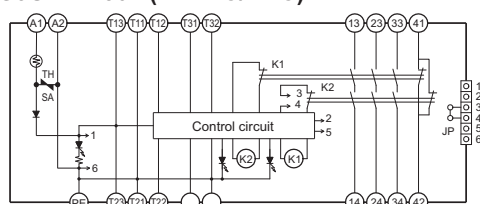
**G9SA-321-T□ (24 VAC/VDC)**



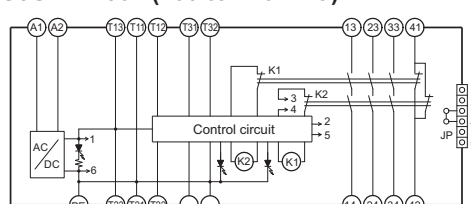
**G9SA-321-T□ (100 to 240 VAC)**



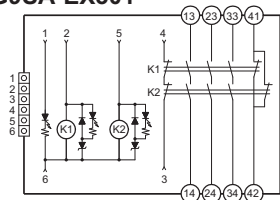
**G9SA-TH301 (24 VAC/VDC)**



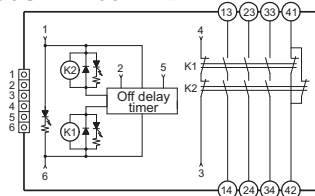
**G9SA-TH301 (100 to 240 VAC)**



**G9SA-EX301**



**G9SA-EX031-T□**



**Note:** 1. 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.

2. With 24-VAC/VDC type, the power supply terminals A1 and A2 have polarities. A2 is the negative pole.

\*1. Use terminals A and B to switch reset mode.

A to B open: Manual reset

A to B closed: Auto-reset

\*2. Terminal T23 is used for 2-channel input with a positive common (when connecting a safety sensor with a PNP output).

When using T23, make sure that T21 and T22 are open.

For 1-channel input, make sure that T12 and T23 are shorted.

\*3. Terminals 43-44 and terminals 53-54 are OFF-delayed outputs.

## Wiring of Inputs and Outputs

| Signal name                  | Terminal name    | Description of operation                                                                                                                                                                          |
|------------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply input           | A1, A2           | The input terminals for power supply. Connect the power source to the A1 and A2 terminals. DC inputs have polarity, so A1 should be connected to the positive side and A2 to the negative side.   |
| Safety input 1               | T11, T12         | To set the safety outputs in the ON state, the ON state signals must be input to both safety input 1 and safety input 2. Otherwise the safety outputs cannot be in the ON state.                  |
| Safety input 2               | T21, T22, T23 *1 |                                                                                                                                                                                                   |
| Feedback/reset input         | T31, T32         | To set the safety outputs in the ON state, the ON state signal must be input to T31 - T32. Otherwise the safety outputs cannot be in the ON state.                                                |
| Instantaneous safety outputs | See below. *2    | Turns ON/OFF according to the state of the safety inputs and feedback/reset inputs. During OFF-delay state, the Instantaneous safety outputs are not able to turn ON.                             |
| OFF-delayed safety outputs   | See below. *2    | OFF-delayed safety outputs. The OFF-delay time is set by the OFF-delay preset switch.                                                                                                             |
| Auxiliary output             | See below. *2    | Synchronized with Instantaneous Safety Output.                                                                                                                                                    |
| Manual/Auto selector input   | A, B *3          | Switch between Auto Reset and Manual Reset modes.                                                                                                                                                 |
| Ground terminal              | PE               | Be sure to connect the PE terminal to a protective earth for 100-240 VAC models. Where the 24 VAC/VDC model power supply is not grounded, please be sure to connect the PE to a protective earth. |

### \*1. Terminal T23

Terminal T23 is used for 2-channel input with a positive common (when connecting a safety sensor with a PNP output). When T23 is being used, please open T21 and T22.

### \*2. Output Contacts

G9SA-301: Safety Output Contacts 13-14, 23-24, 33-34. Auxiliary Contact 41-42.

G9SA-501: Safety Output Contacts 13-14, 23-24, 33-34, 43-44, 53-54. Auxiliary Contact 61-62.

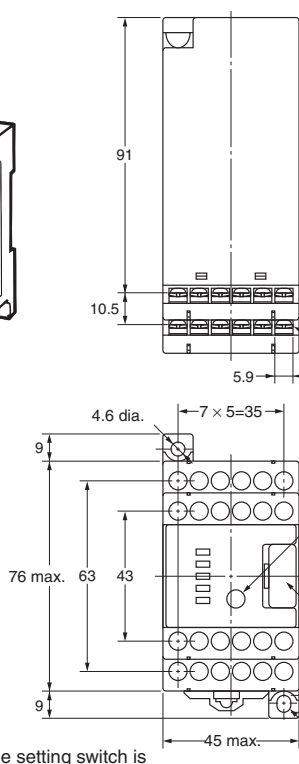
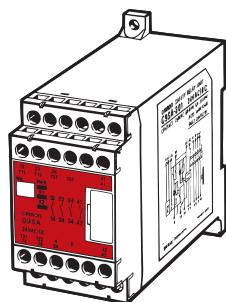
G9SA-321-□: Safety Output Contacts 13-14, 23-24, 33-34. Safety OFF-delay Output Contact 43-44, 53-54. Auxiliary Contact 61-62.

### \*3. Terminals A and B

A-B Opening: Manual Reset

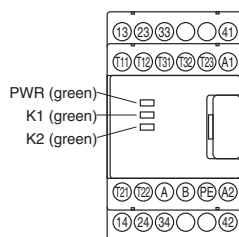
A-B Short Circuit: Auto Reset

G9SA-301  
G9SA-501  
G9SA-321-T ☐  
G9SA-TH301

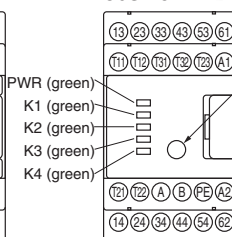


\* Do not remove unless an Expansion Unit is being used.

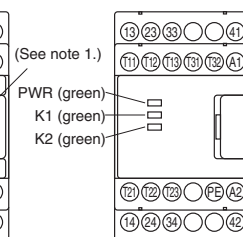
## G9SA-301



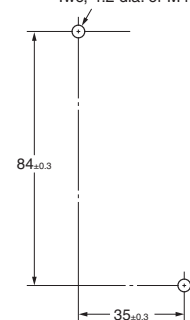
G9SA-301: Twenty, M3  
G9SA-501: Twenty-four, M3  
G9SA-321-T□: Twenty-four, M3  
G9SA-TH301: Twenty-one, M3



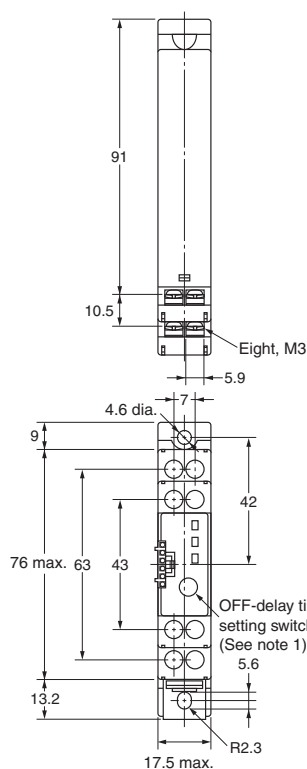
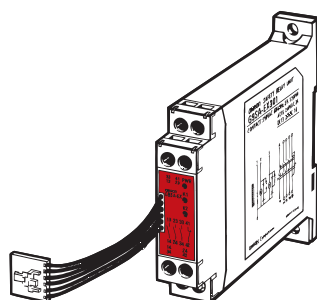
(See note 1.)



Two, 4.2 dia. or M4

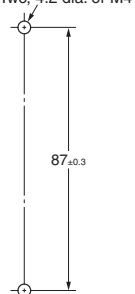


G9SA-EX301  
G9SA-EX031-T ☐

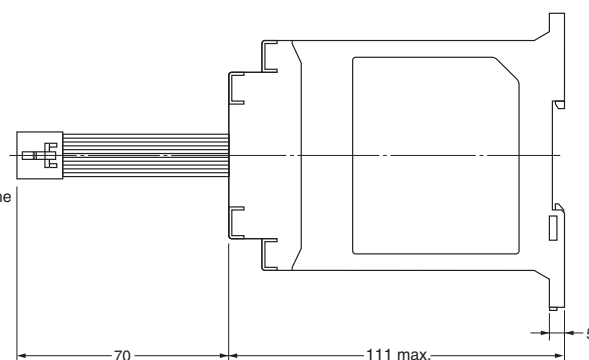
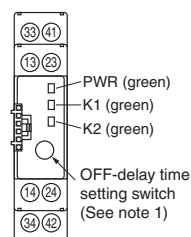


**2:** The K1 and K2 indicators light when the NO contacts of internal relays K1 and K2 close.

Two, 4.2 dia. or M4



G9SA-EX301  
G9SA-EX031-T□



Application Examples

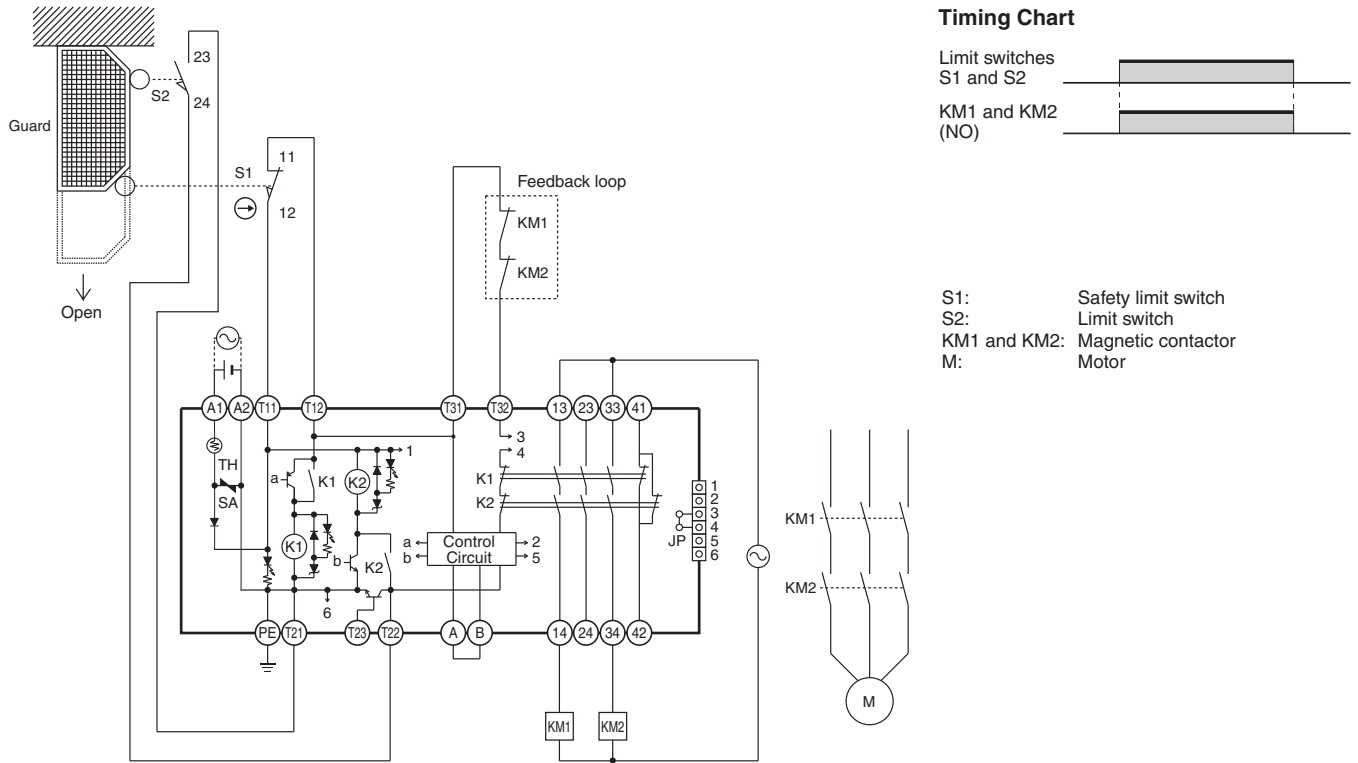
G9SA-301 (24 VAC/VDC) with 2-channel Limit Switch Input/Auto-reset

| Highest achievable PL/<br>safety category | Model                                                                        | Stop category | Reset |
|-------------------------------------------|------------------------------------------------------------------------------|---------------|-------|
| PLe/4 equivalent                          | Safety Limit Switch D4B-N/D4N/D4F<br>Safety Relay Unit G9SA-301 (24 VAC/VDC) | 0             | Auto  |

**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

●Application Overview

- The power supply to the motor M is turned OFF when the S1 and S2 detect that the guard is opened.
- The power supply to the motor M is kept OFF until the guard is closed.



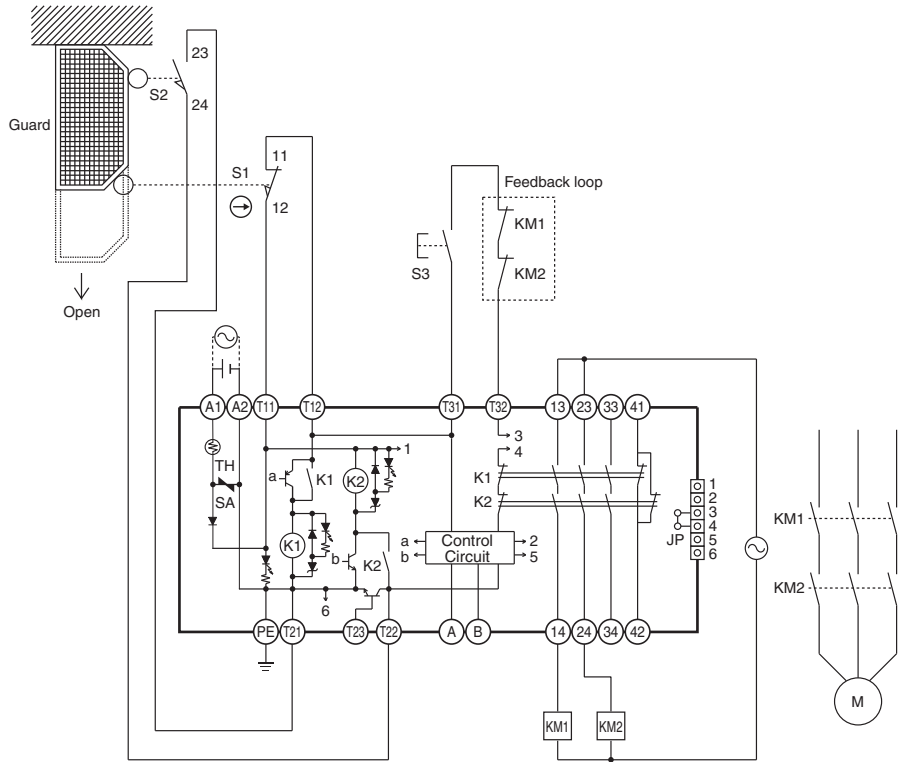
G9SA-301 (24 VAC/VDC) with 2-channel Limit Switch Input/Manual Reset

| Highest achievable PL/<br>safety category | Model                                                                        | Stop category | Reset  |
|-------------------------------------------|------------------------------------------------------------------------------|---------------|--------|
| PLe/4 equivalent                          | Safety Limit Switch D4B-N/D4N/D4F<br>Safety Relay Unit G9SA-301 (24 VAC/VDC) | 0             | Manual |

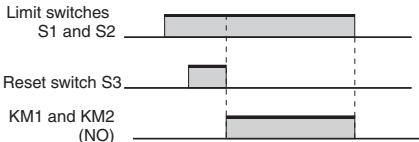
**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

●Application Overview

- The power supply to the motor M is turned OFF when the S1 and S2 detect that the guard is opened.
- The power supply to the motor M is kept OFF until the guard is closed and the reset switch S3 is pressed.



Timing Chart



- S1: Safety limit switch  
S2: Limit switch  
S3: Reset switch  
KM1 and KM2: Magnetic contactor  
M: Motor

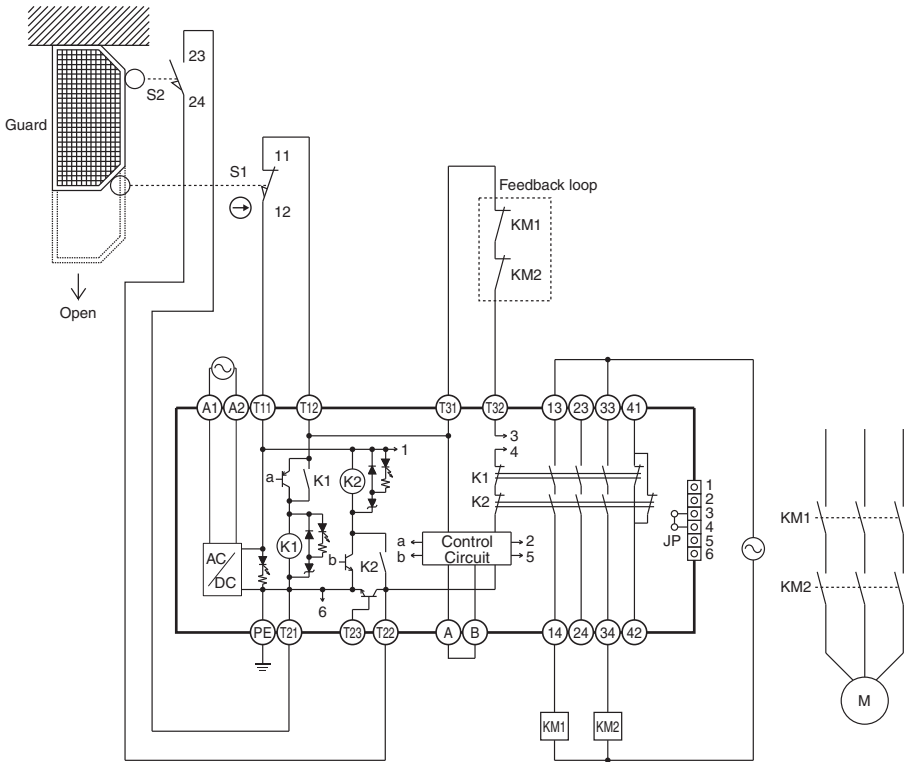
G9SA-301 (100 to 240 VAC) with 2-channel Limit Switch Input/Auto-reset

| Highest achievable PL/<br>safety category | Model                                                                            | Stop category | Reset |
|-------------------------------------------|----------------------------------------------------------------------------------|---------------|-------|
| PLe/4 equivalent                          | Safety Limit Switch D4B-N/D4N/D4F<br>Safety Relay Unit G9SA-301 (100 to 240 VAC) | 0             | Auto  |

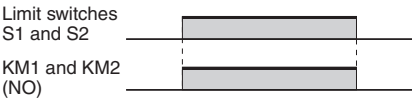
**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

Application Overview

- The power supply to the motor M is turned OFF when the S1 and S2 detect that the guard is opened.
- The power supply to the motor M is kept OFF until the guard is closed.



Timing Chart



S1: Safety limit switch  
S2: Limit switch  
KM1 and KM2: Magnetic contactor  
M: Motor

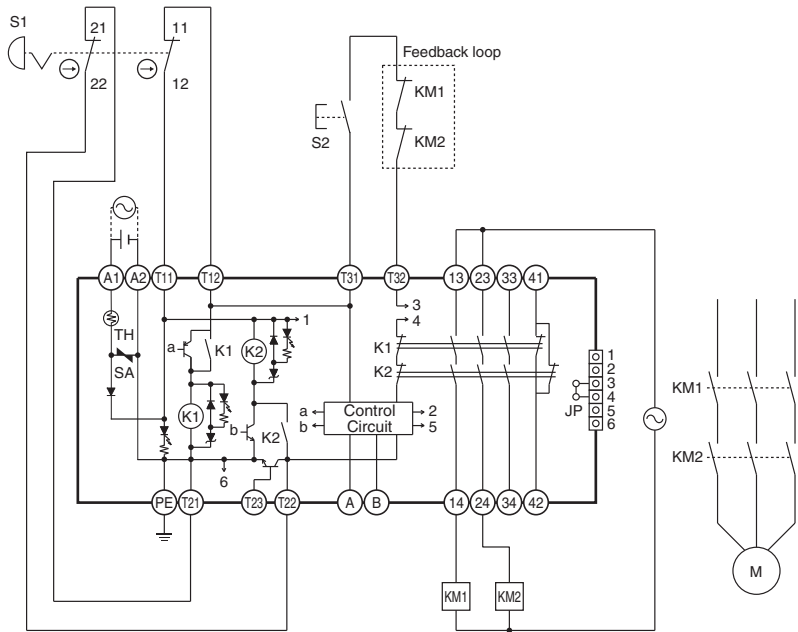
G9SA-301 (24 VAC/VDC) with 2-channel Emergency Stop Switch Input/Manual Reset

| Highest achievable PL/<br>safety category | Model                                                                       | Stop category | Reset  |
|-------------------------------------------|-----------------------------------------------------------------------------|---------------|--------|
| PLe/4 equivalent                          | Emergency Stop Switch A165E/A22E<br>Safety Relay Unit G9SA-301 (24 VAC/VDC) | 0             | Manual |

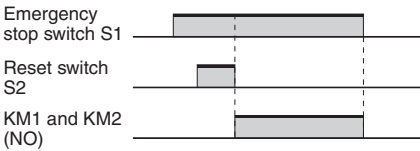
**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

Application Overview

- The power supply to the motor M is turned OFF when the emergency stop switch is pressed.
- The power supply to the motor M is kept OFF until the reset switch S2 is pressed while the emergency stop switch is released.



Timing Chart



S1: Emergency stop switch  
S2: Reset switch  
KM1 and KM2: Magnetic contactor  
M: Motor

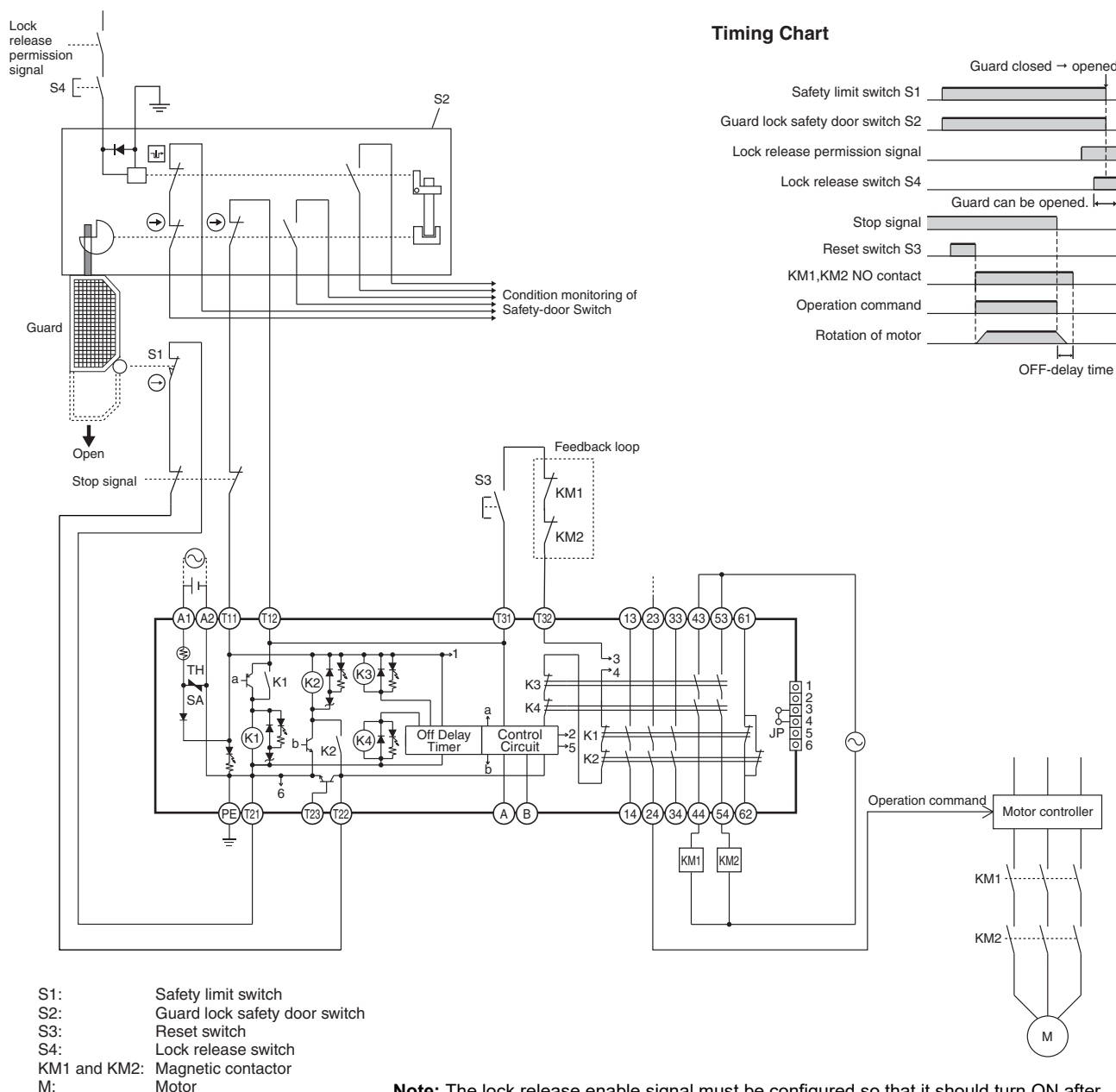
## G9SA-321-T□ (24 VAC/VDC) with Guard Lock Safety-door Switch + Limit Switch Input/Manual Reset

| Highest achievable PL/<br>safety category | Model                                                                                                                             | Stop category | Reset  |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| PLd/3 equivalent                          | Safety Limit Switch D4B-N/D4N/D4F<br>Guard Lock Safety-door Switch D4SL-N/D4NL/D4JL<br>Safety Relay Unit G9SA-321-T□ (24 VAC/VDC) | 1             | Manual |

**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

### Application Overview

- Stop signal input is sent to output a stop command to the motor controller to decelerate the motor M.
- The power supply to the motor M is turned OFF after OFF-delay time.
- After the release of the guard is permitted by the lock release permission signal turned ON, the guard is open by the operation of the lock release switch S4.
- Power supply to the motor M is kept OFF until the closing of the guard is confirmed by the limit switch S1 and guard lock safety-door switch S2, and the reset switch S3 is pressed.



**Note:** The lock release enable signal must be configured so that it should turn ON after dangerous movement is stopped and safety is ensured for the door to open.

## G9SA-321-T□ (24 VAC/VDC) + G9SA-EX031-T□ with Guard Lock Safety-door Switch + Limit Switch Input/Manual Reset

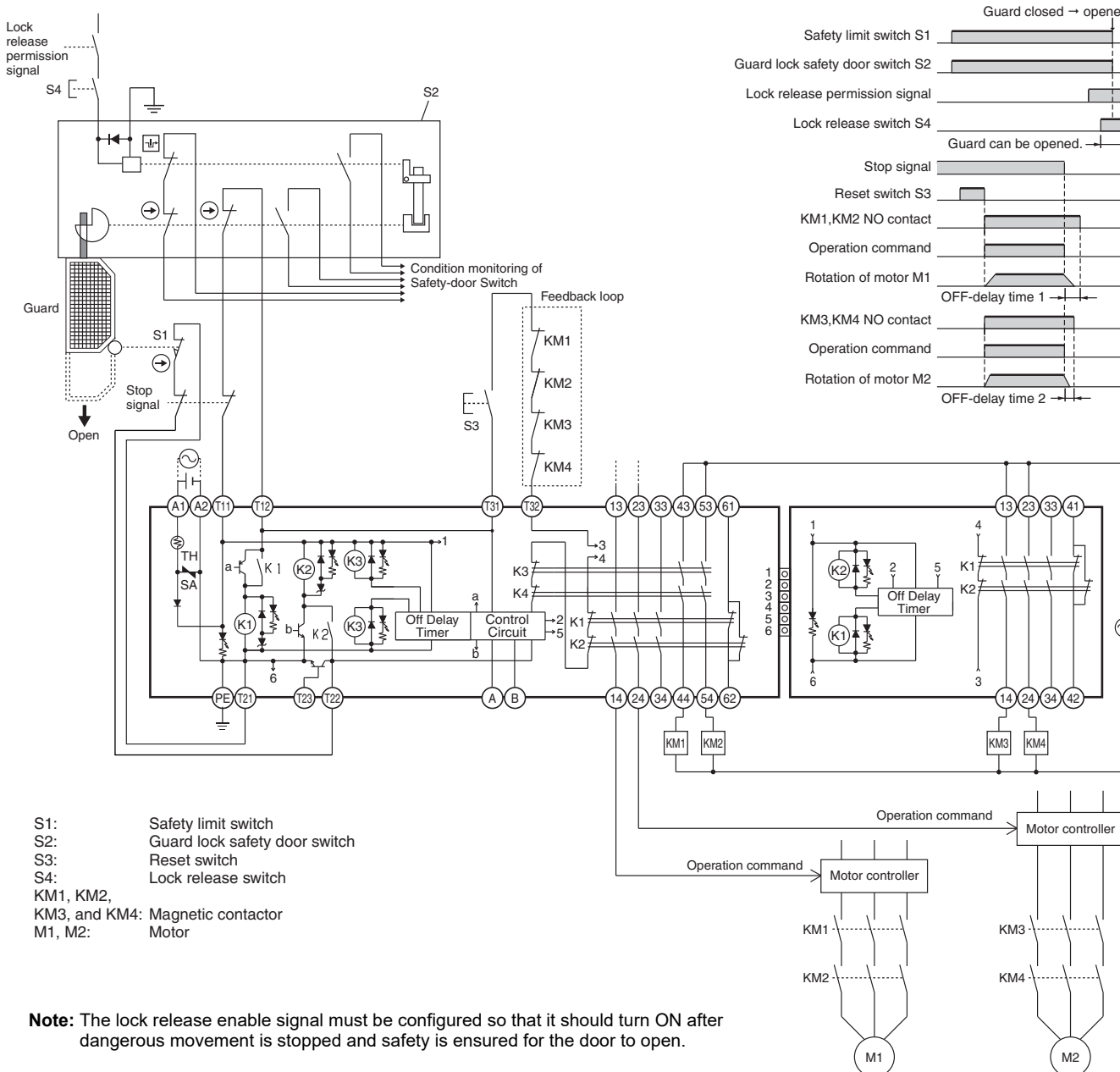
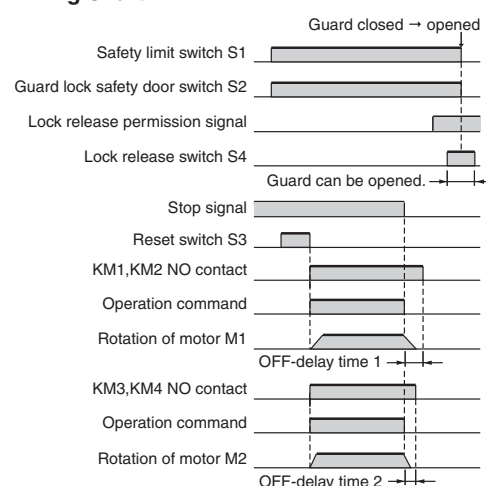
| Highest achievable PL/<br>safety category | Model                                                                                                                                             | Stop category | Reset  |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| PLd/3 equivalent                          | Safety Limit Switch D4B-N/D4N/D4F<br>Guard Lock Safety-door Switch D4SL-N/D4NL/D4JL<br>Safety Relay Unit G9SA-321-T□ (24 VAC/VDC) + G9SA-EX031-T□ | 1             | Manual |

**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

### ●Application Overview

- Stop signal input is sent to output a stop command to the motor controller to decelerate the motor M1 and M2.
- The power supply to the motor M1 and M2 is turned OFF after the OFF-delay time that has been set to each unit.
- After the release of the guard is permitted by the lock release permission signal turned ON, the guard is opened by the operation of the lock release switch S4.
- Power supply to the motor M is kept OFF until the closing of the guard is confirmed by the limit switch S1 and guard lock safety-door switch S2, and the reset switch S3 is pressed.

Timing Chart



**Note:** The lock release enable signal must be configured so that it should turn ON after dangerous movement is stopped and safety is ensured for the door to open.

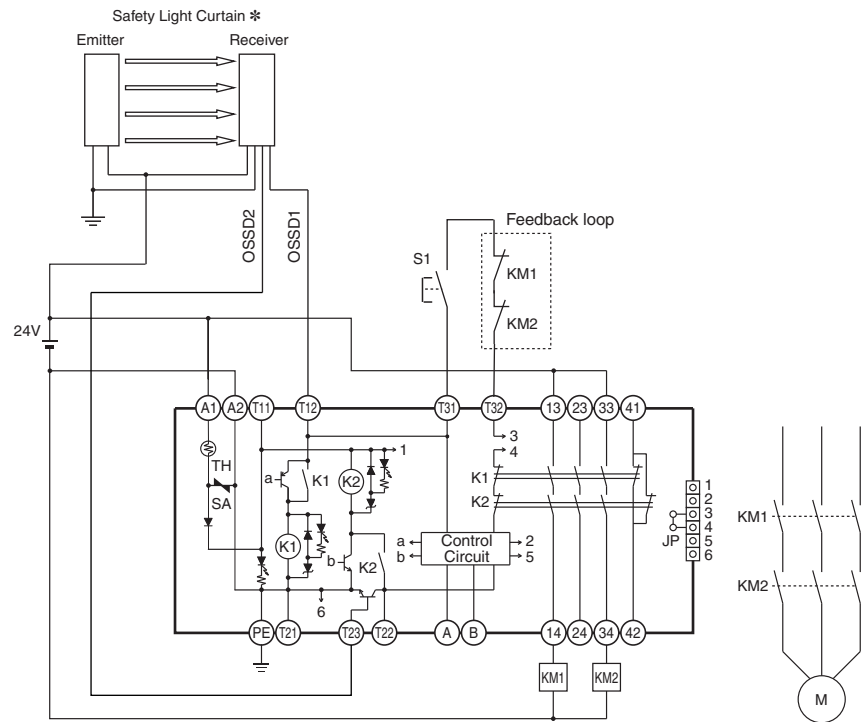
G9SA-301 (24 VAC/VDC) with 2-channel Safety Sensor/Manual Reset (PNP models only)

| Highest achievable PL/<br>safety category | Model                                                                        | Stop category | Reset  |
|-------------------------------------------|------------------------------------------------------------------------------|---------------|--------|
| PLe/4 equivalent                          | Safety Light Curtain F3SJ-A/-B/-E<br>Safety Relay Unit G9SA-301 (24 VAC/VDC) | 0             | Manual |

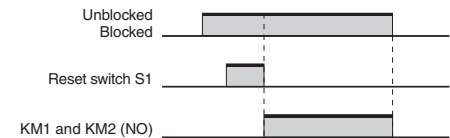
**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

●Application Overview

- The power supply to the motor M is turned OFF when the beam is blocked.
- The power supply to the motor M is kept OFF until the beam is unblocked and the reset switch S1 is pressed.



Timing Chart



S1: Reset switch  
KM1 and KM2: Magnetic contactor  
M: Motor

\* The wiring method will vary depending on the safety light curtain model.  
Review the manuals or other provided documents for the safety light curtain before proceeding with wiring.

## G9SA-TH301 (24 VAC/VDC) with 2-hand Inputs

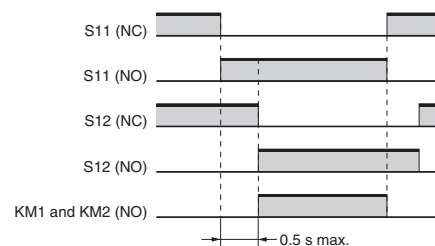
| Highest achievable PL/<br>safety category | Model                                     | Stop category | Reset |
|-------------------------------------------|-------------------------------------------|---------------|-------|
| PLe/4 equivalent                          | Safety Relay Unit G9SA-TH301 (24 VAC/VDC) | 0             | —     |

**Note:** The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

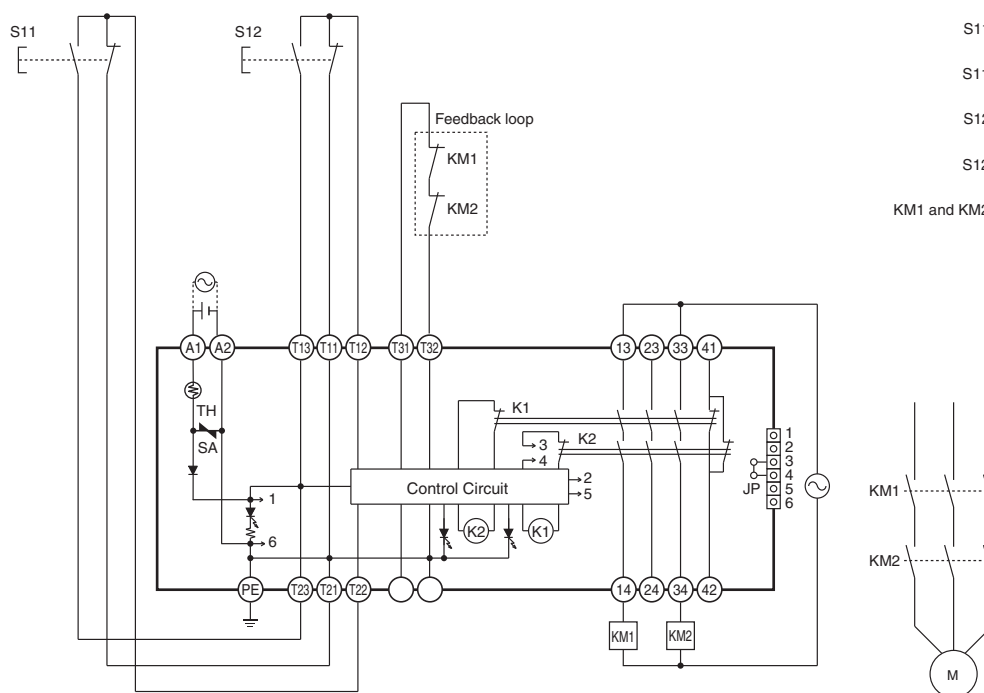
### ●Application Overview

- The motor M is turned ON when the two-hand pushbutton switch S11 and S12 are pressed simultaneously.
- The motor M is turned OFF when one of the two-hand pushbutton switches is released.

### 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:** For S11 and S12, use a 1NO/1NC switch.

## Safety Precautions

Be sure to read the *Common Precautions for Safety Warning* at the following URL: <http://www.ia.omron.com/>.

### Precaution for Safe Use

#### Meanings of Signal Words

The following signal words are used in this manual.

|                                                                                                  |                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>WARNING</b> | Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage. |
| <b>Precautions for Safe Use</b>                                                                  | Supplementary comments on what to do or avoid doing, to use the product safely.                                                                                                                              |
| <b>Precautions for Correct Use</b>                                                               | Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction, or undesirable effects on product performance.                                                              |

#### Meaning of Alert Symbols

|                                                                                   |                              |
|-----------------------------------------------------------------------------------|------------------------------|
|  | Indicates prohibited actions |
|  | Indicates mandatory actions  |

### WARNING

Serious injury may possibly occur due to breakdown of safety outputs. Do not connect loads beyond the rated value to the safety outputs.



Serious injury may possibly occur due to loss of required safety functions. Wire G9SA properly so that supply voltages or voltages for loads do NOT touch the safety inputs accidentally or unintentionally.



### Precautions for Safe Use

- When ready for wiring, the power source should be disconnected first. Further, at operating this unit, the terminal cover should be closed correctly in order to prevent an electrical shock.
- Do not wire in case threat of Lightning. otherwise an electric shock may occur.
- Do not apply any excessive voltage or current to the input or output circuit the G9SA. Doing so may result in damage to the G9SA or cause a fire.
- Do not apply any variable voltage, otherwise G9SA may malfunction.
- Do not connect any overload to the output circuit, otherwise the G9SA in operation will generate excessive heat and the output elements of the G9SA may short-circuit or fire may result.
- The lifetime of G9SA depends on the conditions of switching of its outputs. Be sure to conduct its test operation under actual operating conditions in advance and use it within appropriate switching cycles. Change the G9SA before expected operation. Over operation may cause may short-circuit or may malfunction.
- Do not operate the G9SA with flammable or explosive gass. An arc with operation and the heat of relay will cause a fire or an explosion.
- Do not disassemble, repair, or modify the G9SA, otherwise an electric shock may occur or the G9SA may malfunction.
- Use protective device (Fuse of 5 A current rating etc) for short-circuit protection and ground fault protection, otherwise a fire may occur or the G9SA may malfunction.

### Precautions for Correct Use

- For malfunctions in case that the power supply picks up gradually  
Malfunctions in case that the power supply picks up gradually. In case that the input circuits close before the power supplies, internal logic may malfunction.
- Handling
  - Do not drop the G9SA or shock or vibrate the G9SA excessively. Doing so may result in damage to the G9SA or cause G9SA to malfunction.
  - Do not turn the off-delay setting volume switch of G9SA-321-T□ less than the MIN value or more than the MAX value. Otherwise the G9SA may be failed.
- For adhesion of solvent  
Adhesion of solvent, likely Alcohol, Thinner, Trichloroethane, Gasoline, on the product should be prohibited. Such solvent cause erasing the marking and being inferior of the parts.
- Operating and Storage Environment  
Do not operate or store the G9SA under the following conditions. Doing so may result in damage to the G9SA or cause the G9SA to malfunction.
  - The places with direct sunlight.
  - The places with ambient temperature ranges not within -25 to 55°C.
  - The places with rapid temperature changes resulting in condensation or relative humidity ranges not within 35 to 85% RH.
  - The places with atmospheric pressure out of the range 86 to 106 kpa.
  - The places with corrosive or inflammable gas.
  - The places with water, oil, or chemical sprayed on the G9SA.
  - The places with vibration or shock affecting the G9SA.
  - The places with atmosphere containing dusts, saline or metal powder.
- 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.
- For feedback purpose use devices with contacts capable of switching micro loads of 24 VDC, 5 mA.
- The Safety input OFF signal for T11/T12 (or T23) and T21/T22 terminals must be longer than the response time (10 ms). Otherwise, the G9SA will be locked out or will not be able to be started or restarted. Also, a shorter safety input OFF signal might cause the G9SA to be locked. In this case, all safety inputs must be turned off or the power supply for G9SA must be off before restarting the G9SA.
- Wiring
  - Use the following to wire the G9SA.
    - Stranded wire (Flexible wire): 0.75 to 1.5 mm<sup>2</sup>
    - Solid wire: 1.0 to 1.5 mm<sup>2</sup>
    - Maximum Stripping length: 7 to 8mm
  - The G9SA may malfunction or generate heat.
    - Tighten each screw to a torque of 0.5 to 0.7 N·m
  - External inputs connected to T11 and T12 or T21 and T22 of the G9SA must be no-voltage contact inputs.
  - PE is a ground terminal. When machine is grounded at the positive, the PE terminal should not be grounded.
- This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
- Mounting Expansion units  
When an Expansion Unit is being used, remove the connector cover from the G9SA Master Units and insert the connector of the Expansion Unit's connector cable. Make sure that the connector is correctly locked before operating.

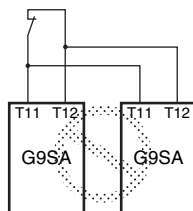
## Connector Cover

Do not remove the connector cover of the G9SA-301, G9SA-501, G9SA-321-T□, or G9SA-TH301 unless an Expansion Unit is being used.

## Connecting Inputs

If using multiple G9SA models, inputs cannot be made using the same switch. This is also true for other input terminals.

Incorrect



## Ground Shorts

The G9SA internal circuits have a positive thermistor (TH) built in, which will detect ground short malfunctions (where S1 and S2 are grounded) and 1-channel and 2-channel short malfunctions, and cut off the safety output. If the short breakdown is repaired, the G9SA automatically recovers.

## Resetting Inputs

When only channel 1 of the 2-channel input turns OFF, the safety output is interrupted. In order to restart when this happens, it is necessary to turn OFF and ON both input channels. It is not possible to restart by resetting only channel 1.

## Resetting Inputs During OFF Delay Time

The G9SA-321-T□ operates as follows according to the reset mode when the inputs are to be re-entered during the OFF delay time of the G9SA-321-T□:

For auto reset, after the OFF delay time has ended, the outputs will turn OFF, and then the outputs will turn ON again.

For manual reset, after the OFF delay time has ended, the outputs will turn OFF, and then the outputs will turn ON again when the reset is input.

## Durability of Contact Outputs

Relay with Forcibly Guided Contact durability depends greatly on the switching condition. Confirm the actual conditions of operation in which the Relay will be used in order to make sure the permissible number of switching operations.

When the accumulated number of operation exceeds its permissible range, it can cause failure of reset of safety control circuit. In such case, please replace the Relay immediately. If the Relay is used continuously without replacing, then it can lead to loss of safety function.

## Applicable Performance Level (PL) (EN ISO13849-1)

G9SA Safety Relay Units can be applied to PLe/Safety Category 4. (The OFF-delay output section of G9SA-321-T□/EX031-T□ is applied to PLd/Safety Category 3.)

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 ISO 13849-1 requirements.

## Certified Standards

The G9SA-301/501/321-T□/TH301/EX301/EX031-T□ conform to the following standards.

- EN standards, certified by TÜV Rheinland:
  - EN60947-5-1
  - EN ISO13849-1
  - EN ISO13849-2
  - EN ISO13851 (G9SA-TH301 only)
- UL standards: UL508 (Industrial Control Equipment)
- CSA standards: CSA C22.2 No. 14 (Industrial Control Equipment)
- CCC Certification: GB/T 14048.5

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