### **Original instructions**



operations and maintenance The qualified personnel shall be qualified and authorized to secure the safety on each phases of design,

installation, running, maintenance and disposal of system (13) A person in charge, who is familiar to the machine in which G9SE is to be installed, shall conduct and verify

a certification body regarding assessment of conformity to the required safety level. (16) OMRON shall not be responsible for conformity with any safety standards regarding to customer's entire

(14) Perform daily and 6-month inspections for the G9SE. Otherwise, the system may fail to work properly, resulting in serious injury. Turn OFF the signal to Safety input and make sure G9SE operates without fault by checking the state of the LED indicator in inspection. (15) Conformity to requirements of performance level is determined as an entire system. It is recommended to consult (17) Dispose of the Units according to local ordinances as they apply Precautions for Correct Use Handle with care Do not drop G9SE to the ground or expose to excessive vibration or mechanical shocks. G9SE may be damaged and may not function properly. Adhesion of solvent such as alcohol, thinner, trichloroethane or gasoline on the product should be avoided. Such solvents make the marking on G9SE illegible and cause deterioration of parts. (3) Conditions of storage Do not store in such conditions stated below 1) In direct sunlight 2) At ambient temperatures out of the range of -10 to 55  $^\circ\mathrm{C}$ 3) At relative humidity out of the range of 25% to 85% or under such temperature change that causes condensation 4) At atmospheric pressure out of the range 86 to 106 kPa. 5) In corrosive or combustible gases 6) With vibration or mechanical shocks out of the rated values. 7) Under splashing of water, oil, chemicals 8) In the atmosphere containing dust, saline or metal powder and other conductive dusts. G9SE may be damaged and may not function properly. (4) At least 50 mm above top face of G9SE and below bottom face of G9SE should be available to apply rated current to outputs of G9SE and for enough ventilation. (5) Mounting multiple units When mounting multiple units close to each other, the rated current will be 3 A. Do not apply a curren higher than 3 A. If the output current is 3 A or more, make sure that there is a minimum distance of m each between all adjacent G9SE units. (6) DIN rail mounting Mount G95E to DIN rails with attachments (TYPE PFP-M, not incorporated to this product), not to mount G95E to DIN rails with attachments (TYPE PFP-M, not incorporated to this product). drop out of rails by vibration etc.especially when the length of DIN railing is short compared to the widths of G9SE. (7) Wire correctly according to 8 Wiring. (7) Wire correctly according to 8 Winng.
(8) Use cables with length less that <u>TD</u>0 m to connect to Safety Inputs, Feed-back/Reset inputs, respectively.
(9) G95E may malfunction due to electro-magnetic disturbances. Be sure to connect the negative terminal DC power supply to ground. When using a DC power supply with light curtains, use DC power supply which has no interruption by a power failure of 20 ms. (10) 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. (11) Do NOT mix AC load and DC load to be switched in the following terminals. - G9SE-201 : between 13-14 terminal and 23-24 terminal - G9SE-401 : between 13-14 terminal and 23-24 terminal, 33-34 terminal and 43-44 terminal - G9SE-221-T<sup>II</sup> : between 13-14 terminal and 23-24 terminal, 37-38 terminal and 47-48 terminal (12) Start entire system after more than 2s have passed since applying supply voltage to G9SE.
 (13) Set the time duration of OFF-delay (Type G9SE-221-T<sub>□</sub>) Set the time duration of OFF-delay to an appropriate value that does not cause the loss of safety function of system.
 Set both of the two Off-delay Time Preset Switches, one each Screw mounting on the front and back, to the same value. When setting the different value, it is detected as a fault. After setting, make sure G9SE operating time is correct. ) To determine safety distance to hazards, take into account the delay of Safety outputs caused by the following time: (14) To det I) Response time Preset off-delay time and accuracy of off-delay time
 Preset off-delay time and accuracy of off-delay time
 Before G9SE outputs become in ON-state, non-regular self-diagnosis for Safety output circuit may be executed. On this occasion, the operating noise of internal relays occurs.
 (16) In the place subjected to strong vibration or shock, mount G9SE to a mounting surface with screws and the screw mounting attachment Otherwise, G9SE may not function properly due to vibration or mechanical shocks out of the rated values caused by sympathetic vibration of G9SE and the mounting parts, and so on. 1 Appearance and Explanation of Each Parts Type G9SE-221-T Type G9SE-201 Type G9SE-401 Sili Sili 94 Ūm ||N1 ||N2 ||OUT OFF-delay G985 -401 0988 -2221-1 24VDC time prese Ħ switch 02 04 08 8 0 108 9 10 202 ШШ Power Supply > 050505050503 Safety Input1 Π Safety Input2 Reset/Feedback 000 000 000 Input Auxiliary output 4040 1040 0,00 0,00 

#### Safety Outputs - Safety Outputs (OFF-delay) LED Indicators Marking Color Name Function Lights up while power is supplied ireen Indicator Blinks corresponding to the occurring erro Safety Input Lights up while high signal is input to T12 range #1 indicator Blinks when error relating to Safety input #1 occur Lights up while high signal is input to T22 Blinks when error relating to Safety input #2 occurs. Safety Input IN2 range #2 indicator OUT Lights up while Safety outputs (13-14, 23-24, 33-34, 43-44) are in ON-state Safety Output nks when an error relating to Safety output occur OFF-delayed Lights up while off-delayed Safety outputs (37-38, 47-48) are in ON-state. Blinks when an error relating to Safety off-delayed solid-state output occurs. OUT2 Safety Output







Name

switch

Inser



111.6

[mm]

## 4 Ratings and Specifications

| Thating        | 95  |   |                 |                  |  |  |
|----------------|---|---|-----------------|------------------|--|--|
| Item           |   | G9SE-201  | G9SE-401        | G9SE-221-T       |  |  |
| Power<br>input | Rated supply voltage  | 24 VDC  |                 |                  |  |  |
|                | Operating voltage range -15% to 10% of rated supply voltage |   |                 |                  |  |  |
|                | Rated power consumption (See Note1)                         | 3 W max.  | 4 W max.        | 4 W max.         |  |  |
| Outputs        | Safety output<br>OFF-delayed Safety output                  | Contact output<br>250 VAC 5 A 30 VDC 5 A (resistive load) |                 |                  |  |  |
|                | Auxiliary output  | PNP transistor outp                                       | ut Load current | : 100 mA DC max. |  |  |

### Specifications and performance

| Spec   |              | ations                                 | s and p   | enormance                               |   |              |              |  |  |
|--|--------------|--|---|---|---|--------------|--------------|--|--|
|  |              |  |   |   | G9SE-201 G9SE-401 G9SE-221-T  |              |              |  |  |
| Operating time (OFF to ON state) (See Note2) |              |  |   | (See Note2)                             | 100 ms Max. (See Note3)   |              |              |  |  |
| Response time (ON to OFF state)              |              |  | 15 ms Max.  |   | 1   |              |              |  |  |
| Accuracy of OFF-delay time                   |              |  | -   | -                                       | Within plus or minus 10 % of the set value  |              |              |  |  |
|  | Inpu         | Input current                          |   |   | 5 mA Min.   |              |              |  |  |
|  | ON           | voltage                                |   |   | 11 VDC Min.   |              |              |  |  |
| Inputs                                       | OFF          | voltage                                | 2   |   | 5 VDC Max.  | 5 VDC Max.   |              |  |  |
|  | OFF          | current                                |   |   | 1 mA Max.   |              |              |  |  |
|  | Max          | imum c                                 | able leng   | th                                      | 100 m Max.  |              |              |  |  |
|  | Res          | et input                               | time  |   | 250 ms Min.   |              |              |  |  |
|  | Con          | tact resi                              | istance (S  | ee Note4)                               | 100 m Max.  |              |              |  |  |
|  | Mec          | hanical                                | durability  | /                                       | 5,000,000 operatio  | ons Min.     |              |  |  |
|  | Elec         | trical du                              | urability   |   | 50,000 operations   | Min.         |              |  |  |
| Contact                                      | Swit         | ching s                                | pecificatio   | on for                                  | AC15:240 VAC 2 A  |              |              |  |  |
| outputs                                      | Indu         | uctive lo                              | ad (IEC/E   | N60947-5-1)                             | DC13:24 VDC 1.5 A   | 4            |              |  |  |
|  | Min          | imum a                                 | pplicable   | load                                    | 24 VDC 4 mA   |              |              |  |  |
|  | Con<br>(IEC) | ditional<br>/EN6094                    | short-cire<br>47-5-1)   | cuit current                            | 100 A (See Note5)   |              |              |  |  |
| Pollution                                    | n deg        | ree                                    |   |   | 2   |              |              |  |  |
| Over vol                                     | tage o       | ategor                                 | y (IEC/EN6  | 50664-1)                                | Safety output: Class III, the others: Class II  |              |              |  |  |
|  |              | Isolatio                               | on voltage  | e(Ui)                                   | 250 VAC   |              |              |  |  |
|  |              | Impulse<br>withstand                   |   | Between input<br>and output             | 6 kV  |              |              |  |  |
| Insulation<br>specification                  |              | voltage(Uimp)<br>(IEC/EN<br>60947-5-1) |   | Between<br>different poles<br>of output | 6 kV (between 13-14/23-24 and 33-34/43-44(37-38/47-48))<br>4 kV (between 13-14 and 23-24,<br>between 33-34(37-38) and 43-44(47-48)) |              |              |  |  |
|  |              | Dielectric<br>strength                 |   | Between input<br>and output             | 2,200 VDC   |              |              |  |  |
|  |              |  |   | Between<br>different poles<br>of output | 1,500 VAC   |              |              |  |  |
|  |              | Insulat                                | tion resist   | ance                                    | 100 M Min.  |              |              |  |  |
| Vibration resistance (See Note6)             |              |  | Frequency:10 to 55 to 10 Hz<br>Amplitude:0.35 mm half amplitude (0.7 mm double amplitude) |   |   |              |              |  |  |
| Mechanical Destruction                       |              |  | 300 m/s <sup>2</sup>  |   |   |              |              |  |  |
| shock resistance                             |              | 100 m/s <sup>2</sup>                   |   |   |   |              |              |  |  |
| (see Note /) Industrie                       |              |  | -10 to 55°C (No freezing or condensation)   |   |   |              |              |  |  |
| Ambient humidity                             |              |  | 25% to 85% PH   |   |   |              |              |  |  |
| Degree of protection                         |              |  |   |   |   |              |              |  |  |
|  |              |  | 11 20   |   |   |              |              |  |  |
| Weight                                       |              |  |   |   | approx. 150 g   | approx.180 g | approx.180 g |  |  |

(1) Power consumption of loads not included

(2) This does not include the bounce time of internal relay in the G9SE.

(3) This is in normal operation. When executing non-regular self-diagnosis for Safety output circuit,

G9SE operating time become 500 ms max..

(4) This is initial value using the voltage-drop method with 1A at 5VDC.
 (5) Use for each contact output an 8A fuse that conforms to IEC 60127 as a short-circuit protection device.

This fuse is not included with the G9SE.

(6) Condition: G9SE is mounted to mounting surface with screw and the screw mounting attachment. In the case of DIN rail mounting, mount DIN rail with G9SE to the place without big vibration (Amplitude guideline: Less than 0.15 mm half amplitude (0.3 mm double amplitude))

Continued on back page

# Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases. NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR

PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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#### •Wiring of inputs and outputs



(1) Construct the safety system taking into account that in the Auto reset mode Safety outputs turn ON automatically when Safety inputs 1 and 2 turn ON.

(2) When the inputs of G9SE-221-T are restored during off-delay time, G9SE-221-T will operate as below. Depending on the reset mode.

- Auto reset mode: Outputs turn off after off-delay time, then immediately turns on. Manual reset mode: Outputs turn off after off-delay time, then turn on when reset input is given.

### Connecting Safety Sensors and G9SE

In many case, Safety Sensor outputs include the off-shot pulse for its self test. The following condition of test pulse is applicable as safety inputs for G9SE. - Off-shot pulse width of the sensor, during the ON-state : 640 µs



→ 640 µs Max.

### •Terminal arrangement and LED indicators

| Type G9SE-201           | Type G9SE-401     | Type G9SE-221-T□  |
|-------------------------|-------------------|-------------------|
| PWR                     | PWR               | PWR               |
| IN1                     | IN1               | <br>∏IN1          |
| IN2                     | IN2               | <br>∏IN2          |
| TUO                     | TUO               | <br>∏OUT1         |
|                         |                   | <br>∏OUT2         |
|                         |                   |                   |
| A1                      | A1                | A1                |
| (A2)                    | (A2)              | (A2)              |
| (T12)                   | (T12)             | (T12)             |
|                         |                   |                   |
| (122)                   | (122)             | (T22)             |
| (131)                   | (131)<br>(T32)    | (13)<br>(T32)     |
| (T33)                   | (T33)             | (T33)             |
| $\sim$ $\times$ 1       | $\sim$ $\times 1$ | $\sim$ $\times 1$ |
|                         |                   |                   |
|                         |                   |                   |
| $  \bigcirc \bigcirc  $ | (23) (24)         | (23) (24)         |
|                         | 33                | 37                |
|                         | (34)              | (38)              |
| (23) (24)               | (43) (44)         | (47) (48)         |
|                         |                   |                   |
|                         |                   |                   |









### 6 Performance level and safety category (EN ISO13849-1)

In the conditions shown in '5.Examples of Application', G9SE can be used for the corresponding safety categories up to 4 and performance level(PL) up to e per ISO13849-1. This does NOT mean that G9SE can always be used for the required category under all the similar conditions and situations.

- Conformity to the categories must be assessed as a whole system. When using G9SE for the safety categories, make sure the conformity of the whole system. 1) Input the signals to both of the Safety inputs (T12 and T22)
- 2) Input a signal to the Safety inputs (T11-T12 and T21-T22) through switches with Direct Opening Mechanism. When using limit switches, at least one of them must have Direct Opening Mechanism. And wiring must be done in a way that a short circuit between the wires of Safety input can be prevented
- 3) When connecting a Safety sensor with G9SE, use a TYPE 4 safety sensor.
- 4) Be sure to connect the negative terminal of DC power supply to ground.
- 5) Use two Safety outputs (e.g. 13-14 and 23-24) to construct the system.
  6) In order to ensure sufficient failure detection, it is mandatory to use G9SE only together with
- contactors or relays with forcibly guided contacts. 7) Input the signal through NC contacts of the contactors to Feedback/Reset input (T31-T32 for manual
- reset or T31-T33 for auto reset). (Refer to '5.Examples of Application'.)

# 7 Fault Detection

When G9SE detects a fault, LED indicators blink to show the information of the fault.

When PWR indicator blinks, check and take needed measures referring to the following table. And then apply supply voltage to G9SE.

|       | LED indicator                     |                       |              |                       | E   | Oliver Line and the second   |  |
|-------|-----------------------------------|-----------------------|--------------|-----------------------|---|--|--|
| PWR   | IN1                               | IN2                   | OUT<br>OUT1  | OUT2                  | the faults  | Checking points and<br>measures to take  |  |
|       | -Ò-<br>Blink                      | _                     | _            | _                     | <ol> <li>Failures involving the wiring of<br/>Safety input 1</li> <li>Failures of the parts of the circuits<br/>of Safety input 1.</li> </ol> | <ol> <li>Check the wiring to T11 and T12.</li> <li>Replace with a new product.</li> </ol>                                    |  |
|       |                                   | - <b>Č</b> -<br>Blink |              | Ι                     | 1) Failures involving the wiring of<br>Safety input 2<br>2) Failures of the parts of the circuits<br>of Safety input 2.                       | <ol> <li>Check the wiring to T21 and T22.</li> <li>Replace with a new product.</li> </ol>                                    |  |
|       | Safety inputs: ON-state           |                       |              |                       | <ol> <li>Failures involving the wiring of<br/>Feedback/Reset input.</li> </ol>  | 1) Check the wiring to T31, T32, and T33   |  |
|       | Light<br>up                       | Light<br>up           | -            | -                     | <ol> <li>Failures of the parts of the circuits<br/>of Feedback/Reset input.</li> </ol>  | 2) Replace with a new product.   |  |
|       | Safety inputs: OFF-state          |                       |              |                       | · · · · · · · · · · · · · · · · · · ·   |  |  |
| Blink | O<br>Light<br>off                 | O<br>Light<br>off     | -            | _                     |   |  |  |
|       | _                                 | _                     | -Ŏ-<br>Blink | -Ò-<br>Blink          | 1) Failures of the parts or relays of the<br>circuits of Safety Output.   | 1) Replace with a new product.   |  |
|       | _                                 | _                     | _            | - <b>Č</b> -<br>Blink | 1) Mismatch of the two Off-delay<br>Time Preset Switches.   | 1) Check both of the two Off-delayTime<br>Preset Switches.   |  |
|       | -┿-<br>The all indicators Blink   |                       |              |                       | 1) Supply voltage outside the<br>rated value.   | 1) Check the supply voltage to G9SE.   |  |
|       | O<br>The all indicators Light off |                       |              |                       | <ol> <li>By excessive electro-magnetic<br/>disturbance.</li> <li>Failures of the parts of internal<br/>circuits</li> </ol>                    | <ol> <li>Check the disturbance level around<br/>G9SE and its related system.</li> <li>Replace with a new product.</li> </ol> |  |

When indicators other than PWR indicator blink while PWR indicator lights up, check and take needed measures referring to the following table. After removing the fault, turn both safety inputs to OFF state.

| LED INUICATOR    |   |   |             |        | Exported courses of   | Checking points and   |  |
|------------------|---|---|-------------|--------|---|---|--|
| PWR              | IN1   | IN2   | OUT<br>OUT1 | OUT2   | the faults  | measures to take  |  |
| ●<br>Light<br>up | Safet<br>-<br>Blink<br>-<br>Blink<br>-<br>C<br>Light<br>off | y inpu<br>Blink<br>O<br>Light<br>O<br>Blink | ts: ON      | -state | 1) Mismatch between Safety input 1<br>and Safety input 2.<br>(OFF timing) | <ol> <li>Check the wiring from safety input devices<br/>to G9SE. Or check the inputs sequence of<br/>safety input devices.</li> </ol> |  |
|                  |   |   |             |        |   |   |  |

### 8 Wiring

Use the following to wire to G9SE.

- Solid wire: AWG24 to AWG16 (0.25 to 1.5 mm<sup>2</sup>)

Stranded wire: AWG24 to AWG16 (0.25 to 1.5 mm<sup>2</sup>)

Strip the cover of wire no longer than 8 to 10 mm

When using stranded wire, insulated ferrule should be used. Use below insulated ferrule.

When using ferrule, G9SE is suitable for Factory Wiring Only. When using G9SE as a "UL Listed" product for Field Wiring, do not use ferrule but insert the strand or solid wire (CU only) directly into the holes on the terminal block.

- Insulated ferrule: AWG24 to AWG16 (0.25 to 1.5 mm<sup>2</sup>)

- Crimp height(H): 2.0 mm max. Width(W): 2.7 mm max. Conductor length: 8 to 10 mm When using the twin type ferrule, use equal-sized wires and preferred insulated ferrule. The twin type ferrule should not be above the adjoining release hole.

Recommended insulated ferrule: manufactured by Phoenix contact Wire size Туре m<sup>2</sup>) AWG Cross section(m Single Al 0.34-8TO 0.34 22 AI 0.5-10WH 0.5 20 AI 0,75-10GY 0.75 18 AI 1-10RD 18 1.0 AI 1.5-10BK 1.5 16 Twin AITWIN2x0.75-10GY 2 x 0.75

How to insert solid wire and insulated ferrule The wire should be pushed into the terminal block straight. No need to use the driver. After inserting, make sure wire is fastened on to terminal block.

Release hole



How to release wire

Use the following minus drive to release wire from terminal block.

And When releasing wire, the power source should be disconnected first. 1. Push the driver lightly into the taper of release hole.

2. Pull out the wire while the driver is pushed into release hole

3. Pull out the driver.





Recommended driver

Type SZF0-0.4mmx2.5mm

manufactured by Phoenix contact Type XW4Z-00B manufactured by Omron

Precautions for Correct wiring

Terminal block may be damaged.

Not push the driver into the release hole straight.
 Not push the driver into the release hole by force of 30N and over.

3. Not tip or twist the driver pushed into release hole.