

Wiring of inputs and outputs

Signal Name	Terminal Name	Description of operation	Wiring
Power supply input	A1, A2	The input terminals for power supply. Connect the power source to the A1 and A2 terminals.	Connect the power supply plus to the A1 terminal. Connect the power supply minus to the A2 terminal.
Safety input 1	T11, T12	To set Safety outputs in ON state, HIGH state signals must be input to both of Safety input 1 and Safety input 2. Otherwise Safety outputs cannot be in ON state.	1-channel Safety input
			2-channel Safety input
Safety input 2	T21, T22		
Reset/ Feedback input	T31, T32, T33	To set Safety outputs in ON state, ON state signal must be input to T33. Otherwise Safety outputs cannot be in ON state. (See Note1)	Auto reset
			Manual reset
Safety output	13-14, 23-24, 33-34, 43-44	Turns ON/OFF according to the state of safety inputs, Feedback/Reset inputs. During off-delay state, safety outputs are not able to turn ON.	Keep these outputs Open when NOT used.
Off-delayed Safety output	37-38, 47-48	Off-delayed safety outputs. (See Note2) Off-delay time is set by off-delay preset switch. When the delay time is set to zero, these outputs can be used as instantaneous outputs.	Keep these outputs Open when NOT used.
Auxiliary output	X1	Outputs a signal of the same logic as Safety outputs	Keep these outputs Open when NOT used.

- 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.
- 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.

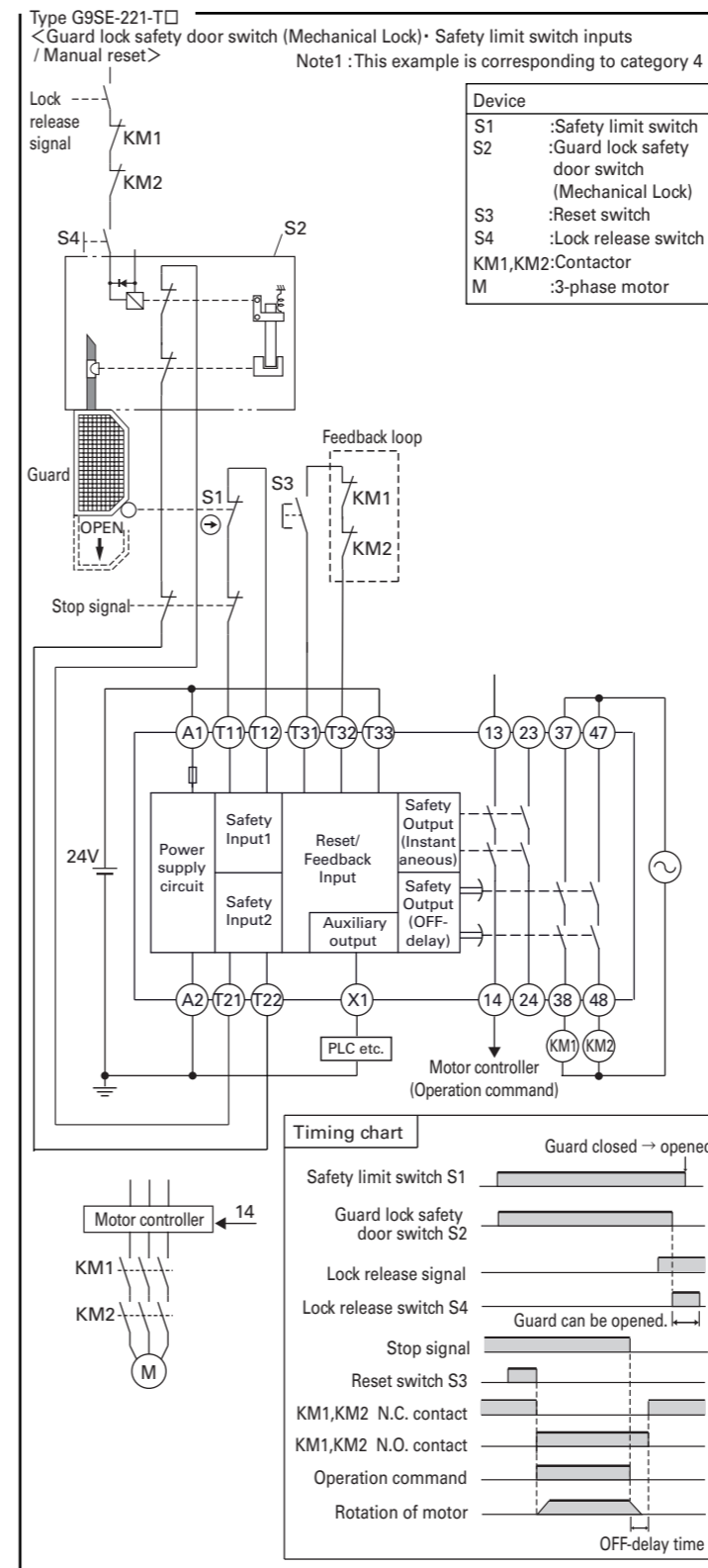
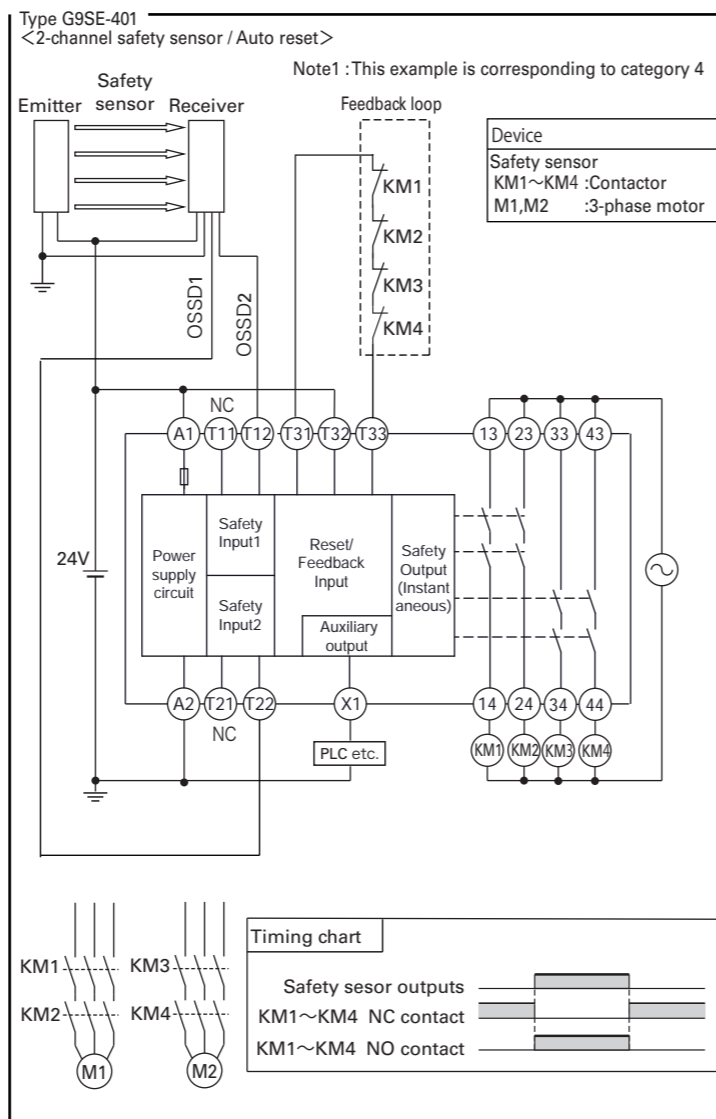
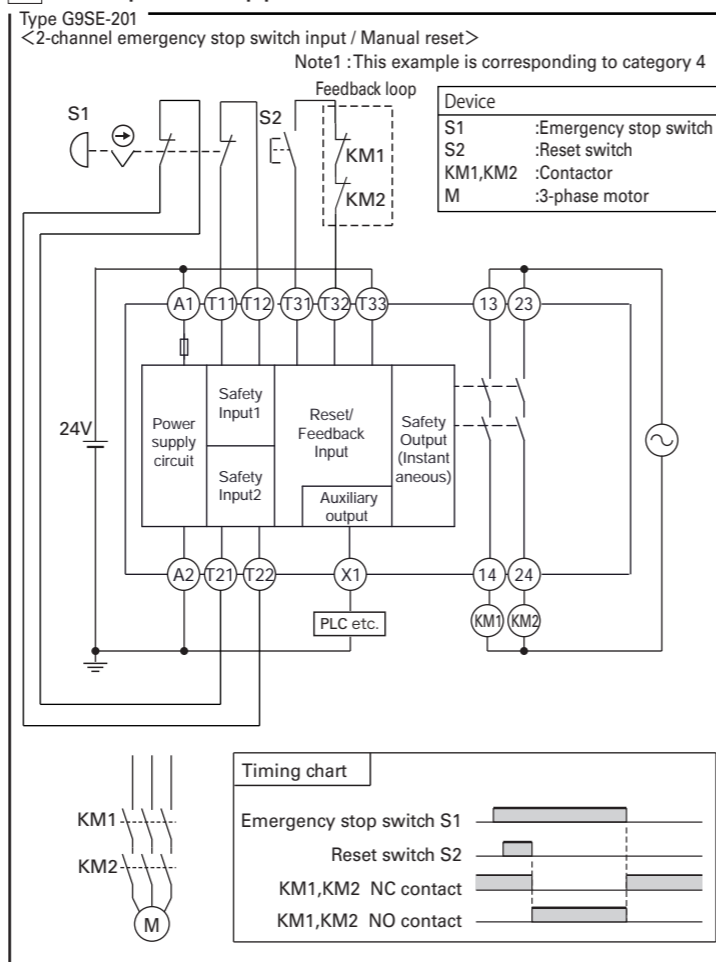
- Off-shot pulse width of the sensor, during the ON-state : 640 μs



Terminal arrangement and LED indicators

Type G9SE-201	Type G9SE-401	Type G9SE-221-T□
<ul style="list-style-type: none"> PWR IN1 IN2 OUT 	<ul style="list-style-type: none"> PWR IN1 IN2 OUT 	<ul style="list-style-type: none"> PWR IN1 IN2 OUT1 OUT2
<ul style="list-style-type: none"> A1 A2 T11 T12 T21 T22 T31 T32 T33 X1 13 14 23 24 	<ul style="list-style-type: none"> A1 A2 T11 T12 T21 T22 T31 T32 T33 X1 13 14 23 24 33 34 43 44 	<ul style="list-style-type: none"> A1 A2 T11 T12 T21 T22 T31 T32 T33 X1 13 14 23 24 37 38 47 48

5 Examples of application



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.
- Input the signals to both of the Safety inputs (T12 and T22)
 - 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.
 - When connecting a Safety sensor with G9SE, use a TYPE 4 safety sensor.
 - Be sure to connect the negative terminal of DC power supply to ground.
 - Use two Safety outputs (e.g. 13-14 and 23-24) to construct the system.
 - In order to ensure sufficient failure detection, it is mandatory to use G9SE only together with contactors or relays with forcibly guided contacts.
 - 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.

PWR	LED indicator				Expected causes of the faults	Checking points and measures to take
	IN1	IN2	OUT OUT1	OUT2		
● Blink	—	—	—	—	1) Failures involving the wiring of Safety input 1 2) Failures of the parts of the circuits of Safety input 1.	1) Check the wiring to T11 and T12. 2) Replace with a new product.
—	● Blink	—	—	—	1) Failures involving the wiring of Safety input 2 2) Failures of the parts of the circuits of Safety input 2.	1) Check the wiring to T21 and T22. 2) Replace with a new product.
● Light up	● Light up	—	—	—	1) Failures involving the wiring of Feedback/Reset input. 2) Failures of the parts of the circuits of Feedback/Reset input.	1) Check the wiring to T31, T32, and T33 2) Replace with a new product.
● Blink	● Light off	● Light off	—	—	1) Failures of the parts or relays of the circuits of Safety Output.	1) Replace with a new product.
—	—	—	● Blink	● Blink	1) Mismatch of the two Off-delay Time Preset Switches.	1) Check both of the two Off-delay Time Preset Switches.
—	—	—	● Blink	—	1) Supply voltage outside the rated value.	1) Check the supply voltage to G9SE.
—	—	—	○ The all indicators Blink	—	1) By excessive electro-magnetic disturbance. 2) Failures of the parts of internal circuits	1) Check the disturbance level around G9SE and its related system. 2) Replace with a new product.

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.

PWR	LED indicator				Expected causes of the faults	Checking points and measures to take
	IN1	IN2	OUT OUT1	OUT2		
● Light up	● Safety inputs: ON-state	● Blink	● Blink	—	1) Mismatch between Safety input 1 and Safety input 2. (OFF timing)	1) Check the wiring from safety input devices to G9SE. Or check the inputs sequence of safety input devices.
—	● Blink	● Blink	—	—		
—	● Blink	○ Light off	—	—		
—	○ Light off	○ Blink	—	—		

8 Wiring

Use the following to wire to G9SE.

- Solid wire: AWG24 to AWG16 (0.25 to 1.5 mm²)
- Stranded wire: AWG24 to AWG16 (0.25 to 1.5 mm²)

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 mm²)
- 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.

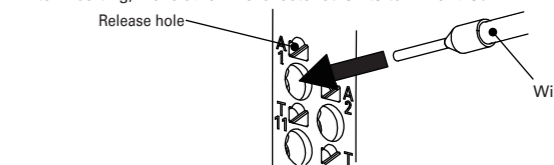
The twin type ferrule should not be above the adjoining release hole.

Recommended insulated ferrule: manufactured by Phoenix contact

Type	Wire size	
	Cross section(mm ²)	AWG
Single	Al 0,34-8TQ	0,34 22
	Al 0,5-10WH	0,5 20
	Al 0,75-10GY	0,75 18
	Al 1-10RD	1,0 18
	Al 1.5-10BK	1,5 16
Twin	AlTWIN2x0.75-10GY	2 x 0.75 —

How to insert solid wire and insulated ferrule

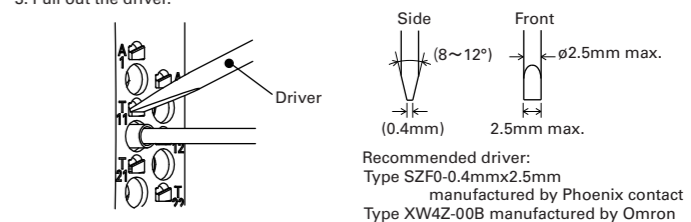
The wire should be pushed into the terminal block straight. No need to use the driver. After inserting, make sure wire is fastened on to terminal block.



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.
- Push the driver lightly into the taper of release hole.
 - Pull out the wire while the driver is pushed into release hole.
 - Pull out the driver.



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