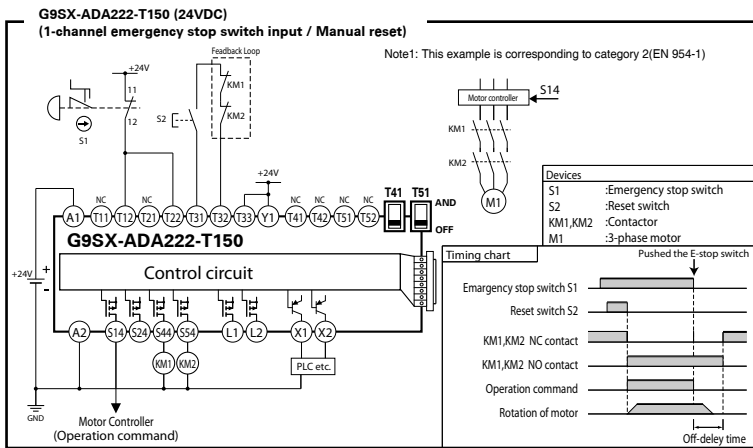
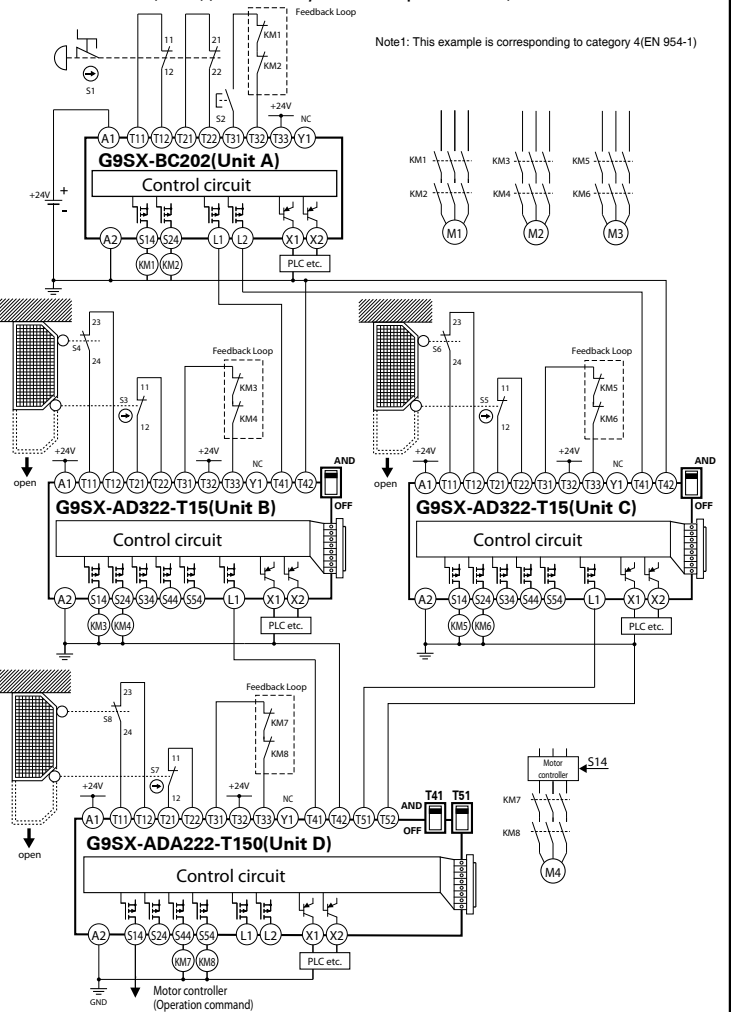


5 Examples of application

Application and timing chart



G9SX-BC202 (24VDC) (2-channel emergency stop switch input / Manual reset)
+ G9SX-AD322-T15 (24VDC) (2-channel safety limit switch input / Auto reset)
+ G9SX-AD322-T15 (24VDC) (2-channel safety limit switch input / Auto reset)
+ G9SX-ADA222-T150 (24VDC) (2-channel safety limit switch input / Auto reset)



Wiring of inputs and outputs

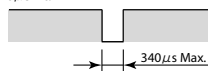
Signal Name	Terminal Name	Description of operation	Wiring
Power supply input	A1, A2	The input terminals for power supply. Connect the power source to the A1 and A2 terminals.	Connect the power supply plus to the A1 terminal. Connect the power supply minus to the A2 terminal.
Safety input 1	T11, T12	To set Safety solid-state outputs in ON state, HIGH state signals must be input to both of Safety input 1 and Safety input 2. Otherwise Safety solid-state outputs cannot be in ON state.	Corresponds to category 2 Corresponds to category 3 Corresponds to category 4
Safety input 2	T21, T22		
Feedback/Reset input	T31, T32, T33	To set Safety solid-state outputs in ON state, ON state signal must be input to T33. Otherwise Safety solid-state outputs cannot be in ON state. To set Safety solid-state outputs in ON state, the signal input to T32 must change from OFF state to ON state, and then to OFF state. Otherwise Safety solid-state outputs cannot be in ON state.	Auto reset Manual reset
Logical AND connection input1	T41, T42	Logical AND connection means that lower unit (Unit C) calculates the logical multiplication (AND) of the safety output information from upper unit (Unit A, Unit B) and safety input signal "c", which is input to lower unit. In the example in the right, the safety output of Unit C is "a" AND "b" AND "c".	
Logical AND connection input2	T51, T52	Connect L1 or L2 of upper unit to T41 or T51 of lower unit, and connect GND of upper unit to T42 or T52 of lower unit. See Relation between each Logical AND connection preset switch and Safety output state for conditions for safety output to be in the ON state.	
Cross fault detection input	Y1	Selects a mode of failure detecting (Cross fault detecting) function for safety inputs of G9SX corresponding to the connection of Cross fault detection input.	Keep Y1 open when using T11, T21. (Wiring corresponding to category 4) Connect Y1 to 24VDC when NOT using T11, T21. (Wiring corresponding category 2 or 3, or when connecting safety sensors and corresponding up to category 4.)
Safety solid-state output	S14, S24	Turns ON/OFF according to the state of safety inputs, Feedback/Reset inputs, and Logical AND connection inputs. During off-delay state, safety solid-state outputs are not able to turn ON.	Keep these outputs Open when NOT used.
Off-delayed safety solid-state output	S44, S54	Off-delayed safety solid-state outputs. Off-delay time is set by off-delay preset switch. When the delay time is set to zero, these outputs can be used as non-delay outputs.	Keep these outputs Open when NOT used.
Logical connection output	L1, L2	Outputs a signal of the same logic as Safety solid-state outputs.	Keep these outputs Open when NOT used.
Auxiliary Monitor output	X1	Outputs a signal of the same logic as Safety solid-state outputs	Keep these outputs Open when NOT used.
Auxiliary Error output	X2	Outputs during error indicator is lighting up or blinking.	Keep these outputs Open when NOT used.

Connecting Safety Sensors and G9SX

1) When connecting Safety sensors with G9SX, Y1 terminal must be connected to 24VDC.
G9SX will detect the connection error, if Y1 terminal is open.

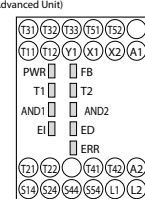
2) In many case, Safety Sensor outputs include the off-shot pulse for its self test.
The following condition of test pulse is applicable as safety inputs for G9SX.

- Off-shot pulse width of the sensor, during the ON-state : 340µs Max.



Terminal arrangement and LED indicators

TYPE G9SX-ADA222-□-□
(Advanced Unit)



6 Category of EN 954-1, ISO13849-1

In the condition shown in '5.Examples of Application', G9SX can be used for the corresponding categories up to category 4 per EN954-1 and performance level(PL) up to e per ISO13849-1. This does NOT mean that G9SX can always be used for required category under all the similar conditions and situations. Conformity to the categories must be assessed as a whole system.

When using G9SX for safety categories, be sure to confirm the conformity as a whole system.

- 1) Input the signals to both of the Safety inputs (T11-T12 and T21-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.

When connecting Safety sensor with G9SX, use TYPE 4 safety sensor.

- 3) Input the signal through a NC contact of the contactor to Feedback/Reset input (T31-T32 for manual reset or T31-T32 for auto reset). (Refer to '5.Examples of Application')
- 5) Keep Cross fault detection mode input (Y1) open. However, when connecting devices with self-diagnosis function, such as safety sensors, apply 24VDC to Y1.
- 6) Be sure to Connect A2 to ground.

7 Fault Detection

When G9SX detects a fault, ERR indicator and/or indicators light up or blink to show the information of the fault.

Check and take needed measures referring to the following table, and then apply supply voltage to G9SX.

ERR indicator	Other indicators	Faults	Expected causes of the faults	Checking points and measures to take
Blink	-	Faults by electro-magnetic disturbance or of internal circuits.	1) By excessive electro-magnetic disturbance 2) Failures of the parts of internal circuits	1) Check the disturbance level around G9SX and its related system. 2) Replace with a new product.
T1 Blink	-	Faults involved with Safety input 1	1) Failures involving the wiring of Safety input 1 2) Incorrect set values of Off-delay time. 3) Failures of the parts of the circuits of Safety input 1	1) Check the wiring to T11 and T12. 2) Check the wiring to Y1. 3) Replace with a new product.
T2 Blink	-	Faults involved with Safety input 2	1) Failures involving the wiring of Safety input 2 2) Incorrect setting of Cross fault detection mode. 3) Failures of the parts of the circuits of Safety input 2	1) Check the wiring to T21 and T22. 2) Check the wiring to Y1. 3) Replace with a new product.
FB Blink	-	Faults involved with Feedback/Reset input	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.
Light up	-	Faults of Expansion units	1) Improper feedback signals from Expansion units 2) Abnormal supply voltage to Expansion units 3) Failures of the parts of the circuits of Safety relay contact outputs	1) Check the connecting cable of Expansion units and the connection of the termination socket. 2) Check the supply voltage to Expansion units. 3) Make sure that all Expansion units' PWR indicators are lighting. 3) Replace the Expansion unit with a new one.
EI Blink	-	Faults involved with Safety solid-state outputs or Logical connection outputs	1) Failures involving the wiring of Safety solid-state outputs 2) Failures of the parts of the circuits of Safety solid-state outputs 3) Failures involving the wiring of Logical connection output 4) Failures of the parts of the circuits of Logical connection output 5) Impermissible high ambient temperature	1) Check the wiring to S14, S24, and S34 2) Replace with a new product. 4) Check the wiring to L1 and L2 4) Replace with a new product. 5) Check the ambient temperature and spacing around G9SX.
ED Blink	-	Faults involved with Off-delayed Safety solid-state outputs	1) Failures involving the wiring of Off-delayed Safety relay contact outputs 2) Incorrect set values of Off-delay time 3) Failures of the parts of the circuits of Off-delayed Safety relay contact outputs 4) Impermissible high ambient temperature	1) Check the set values of the two of Off-delay time preset switches. 3) Replace with a new product. 4) Check the ambient temperature and spacing around G9SX.
AND1 or AND2 Blink	-	Faults involved with Logic AND connection input1 or Logic AND connection input2	1) Failures involving the wiring of Logic AND connection input1 or 2 2) Incorrect setting for Logic AND connection input1 or 2	1) Check the wiring to T41 and T42 (T51 and T52) 2) Make sure that the wiring length for T41, T42, T51, T52 terminals is less than 100 meters, respectively 2) Make sure that the Logical AND connection signal is branched for less than 4 units. 3) Replace with a new product.
The All (without PWR) indicators Blink	-	Supply voltage outside the rated value	1) Supply voltage outside the rated value	1) Check the supply voltage to Expansion units.

When indicators other than ERR indicator while ERR indicator keeps lit off, check and take needed actions referring to the following table.

ERR indicator	The other indicators	Conditions	Expected causes of the faults	Expected causes of the faults
Light off	T1 Blink or T2 Blink	Mismatch between input 1 and input 2	1) Input status between input 1 and input 2 is different. cause of contact failure or short circuit of safety input device(s) or any wiring fault.	1) Check the wiring from safety input devices to G9SX. Or check the inputs sequence of safety input devices. After removing the fault, turn both safety inputs to OFF state.