Original instructions

OMRON

Type G9SX-ADA222-T□-□

Flexible Safety Unit

English **USER'S MANUAL**

Thank you for purchasing G9SX Flexible Safety Unit.
Please read and understand this manual before using the products.
Keep this manual ready to use whenever needed.
Only qualified person trained in professional electrical technique should handle G9SX.

Please consult your OMRON representative if you have any questions or comments.
Make sure that information written in this document are delivered to the final user of the product.

OMRON Corporation

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EU Declaration of Conformity

OMRON declares that G9SX is in conformity with the requirements of the following EU Directives:

EMC Directive 2014/30/EU
Machinery Directive 2006/42/EC

Standards

G9SX is designed and manufactured in accordance with the following standards:

EN ISO13849-1:2015 Category 4 PL e,
IEC/EN61508 SIL3,
IEC/EN61000-6-2, IEC/EN61000-6-4,
UL508, UL1998,
CAN/CSA C22.2 No.142

Safety Precautions

Meanings of Signal Words

The following signal words are used in this manual.

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, will resultin minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

Meaning of Alert Symbols

The following alert symbols are used in this manual.

⃠	Indicates prohibited actions
❗	Indicates mandatory actions

Alert Statements

⚠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 G9SX properly so that supply voltages or voltages for loads do NOT touch the safety inputs accidentally or unintentionally. ❗

Serious injury may possibly occur due to damages of safety inputs.
Apply protection circuitry against back electromotive force in case connecting inductive loads to safety outputs. ❗

Serious injury may possibly occur due to loss of safety functions.
Use appropriate devices referring to the information shown below. ❗

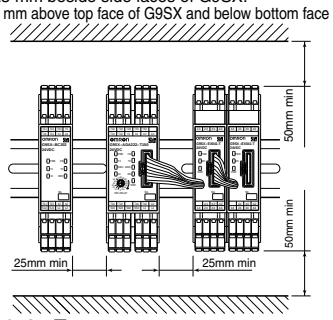
Controlling Devices	Requirements
Emergency stop switch	Use approved devices with Direct Opening Mechanism complying with IEC/EN 60947-5-1
Door interlocking switch Limit switch	Use approved devices with Direct Opening Mechanism complying with IEC/EN 60947-5-1 and capable of switching micro loads of 24VDC, 5mA.
Safety Sensor	Use approved devices complying with the relevant product standards, regulations and rules in the country where it is used.
Relay with forcibly guided contacts	Use approved devices with forcibly guided contacts complying with IEC 61810-3 (EN 50205). For feedback purpose use devices with contacts capable of switching micro loads of 24VDC, 5mA.
Contactor	Use approved devices complying with IEC/ EN 60947-4-1 auxiliary contact linked with power contact (mirror contact). For feedback purpose use devices with contacts capable of switching micro loads of 24 VDC, 5 mA.
Other devices	Evaluate whether devices used are appropriate to satisfy the requirements of safety category level.

Precautions for Safe Use

(1) Use G9SX within an enclosure with IP54 protection or higher of IEC/EN60529
(2) Incorrect wiring may lead to loss of safety function. Wire conductors correctly and verify the operation of G9SX before commissioning the system in which G9SX is incorporated.
(3) Do not apply DC voltages exceeding the rated voltages, nor any AC voltages to G9SX. Do not connect to DC distribution network.
(4) Use DC supply satisfying requirements below to prevent electric shock.
- DC power supply with double or reinforced insulation, for example, according to IED/EN60950 or EN50178 or a tranceformer according to IEC/EN61558.
- DC supply satisfies the requirement for class 2 circuits or limited voltage/current circuit stated in UL 508.
(5) Apply properly specified voltages to G9SX inputs.
Applying inappropriate voltages cause G9SX to fail to perform its specified function, which leads to the loss of safety functions or damages to G9SX
(6) Auxiliary error outputs and auxiliary monitoring outputs are NOT safety outputs. Do not use auxiliary outputs as any safety output.
Such incorrect use causes loss of safety function of G9SX and its relevant system.
Also Logical connection outputs can only be used for logical connections between G9SXs.
(7) After installation of G9SX, qualified personnel should confirm the installation, and should conduct test operations and maintenance.
The qualified personnel should be qualified and authorized to secure the safety on each phases of design, installation, running, maintenance and disposal of system.
(8) A person in charge, who is familiar to the machine in which G9SX is to be installed, should conduct and verify the installation.
(9) Turn OFF the signal to Safety input or Logical AND connection input every 24hours and make sure G9SX operates without faults by checking the state of the ERR indicator.
(10) Do not dismantle, repair, or modify G9SX. It may lead to loss of its safety functions.
(11) Use only appropriate components or devices complying with relevant safety standards corresponding to the required level of safety categories. Conformity to requirements of safety category is determined as an entire system. It is recommended to consult a certification body regarding assessment of conformity to the required safety level.
(12) OMRON shall not be responsible for conformity with any safety standards regarding to customer's entire system.
(13) Disconnect G9SX from power supply when wiring. Devices connected to G9SX may operate unexpectedly.
(14) Be cautious not to have your fingers caught when attaching terminal sockets to the plugs on G9SX.

Precautions for Correct Use

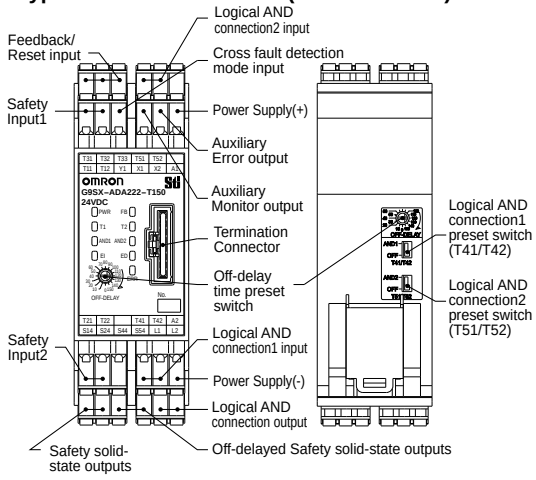
(1) Handle with care
Do not drop G9SX to the ground or expose to excessive vibration or mechanical shocks. G9SX may be damaged and may not function properly.
(2) Conditions of storage
Do not store in such conditions stated below.
1) In direct sunlight
2) At ambient temperatures out of the range of -10 to 55 ºC
3) At relative humidity out of the range of 25% to 85% or under such temperature change that causes condensation.
4) In corrosive or combustible gases
5) With vibration or mechanical shocks out of the rated values.
6) Under splashing of water, oil, chemicals
7) In the atmosphere containing dust, saline or metal powder. G9SX may be damaged and may not function properly.
(3) Mounting
Mount G9SX to DIN rails with attachments (TYPE PFP-M, not incorporated to this product), not to drop out of rails by vibration etc. especially when the length of DIN railing is short compared to the widths of G9SX.
(4) Following spacing around G9SX should be available to apply rated current to outputs of G9SX and for enough ventilation and wiring:
a) At least 25 mm beside side faces of G9SX.
b) At least 50 mm above top face of G9SX and below bottom face of G9SX.



(5) Wiring
1) For model G9SX-□
Use the following to wire to G9SX-□.
-Solid wire: 0.2 to 2.5mm^2 AWG24 to AWG12
-Stranded wire (Flexible wire): 0.2 to 2.5mm^2 AWG24 to AWG12
Strip the cover of wire no longer than 7mm.
2) For model G9SX-□-RT (with screw terminals)
Tighten each screw with a specified torque of 0.5 to 0.6N·m, or the G9SX-□ may malfunction or generate heat.
3) For Logical AND Connection
Use VCTF cable or shielded cable for Logical AND connection between units.
(6) When connecting Expansion Units (G9SX-EX□-□) to Advanced Unit:
1) Follow the procedure below:
a) Remove the termination connector from the receptacle on Advanced Unit,
b) Insert the head of the connecting cable of Expansion Unit to the receptacle on the Advanced Unit
c) Set the termination connector to the receptacle on the Expansion Unit at the end position. When Advanced Unit is used without expansion units, leave the termination connector set on the Advanced Unit.
2) Do not remove the termination connecter while the system is operating.
3) Before applying supply voltage, confirm that the connecting sockets and plugs are locked firmly.
4) All of the Expansion Units should be supplied with its specified voltages within 10s after the connected Advanced Unit is supplied with voltage.
Otherwise, Advanced Unit detects the power-supply error for the Expansion Units.
(7) Use cables with length less than 100m to connect to Safety Inputs, Feed-back/Reset inputs, or between Logical AND connection inputs and Logical connection outputs,respectively.
(8) Set the time duration of OFF-delay to an appropriate value that does not cause the loss of safety function of system.
(9) Logical connection between Units:
1) When using Logical AND connection inputs, set the Logical connection preset switch to 'AND' position for the units which the logical connection signal are input to.
2) Connect Logical connection outputs appropriately to Logical AND connection inputs of the relevant unit. Verify the operation of G9SX before commissioning the system.
3) When configuring the safety related system, be sure to consider that the delay of response time caused by logical connections do not degrade the safety function of the system.
(10) To determine safety distance to hazards, take into account the delay of Safety outputs caused by the following time:
1) Response time of Safety inputs
2) Response time of Logical AND connection input (See also "Ratings and specifications, note5")
3) Preset off-delay time
4) Accuracy of off-delay time
(11) Start entire system after more than 5s have passed since applying supply voltage to all G9SXs in the system.
(12) G9SX may malfunction due to electro-magnetic disturbances.
Be sure to connect the terminal A2 to ground.
When using a DC power supply with light curtains, use DC power supply which has no interruption by a power failure of 20ms.
(13) Devices connected to G9SX may operate unexpectedly.
When replacing G9SX, disconnect it from power supply.
(14) Adhesion of solvent such as alcohol, thinner, trichloroethane or gasoline on the product should be avoided. Such solvents make the marking on G9SX illegible and cause deterioration of parts.
(15)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.
(16) Operate the reset input more than 0.4 seconds immediately after the safety outputs are OFF.
G9SX does not accept the reset input from when the outputs are turned ON and until 0.4 seconds passes after the outputs are turned OFF.

1 Appearance and Explanation of Each Parts

Type G9SX-ADA222-T□-□ (Advanced Unit)



LED Indicators

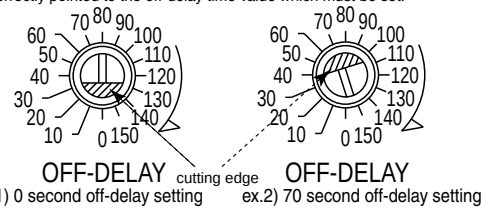
Marking	Color	Name	Function
PWR	Green	Power Supply Indicator	- Lights up while power is supplied.
ERR	Red	Error Indicator	- Lights up or blinks corresponding to the occurring error (*1)
T1	Orange	Safety input #1 Indicator	- Lights up while high signal is input to T12 - Blinks when error relating to Safety input #1 occurrs. (*1)
T2	Orange	Safety input #2 Indicator	- Lights up while high signal is input to T22 - Blinks when error relating to Safety input #2 occurrs. (*1)
AND1	Orange	Logical AND input1 Indicator	- Lights up while high signal is input to T41. - Blinks when error relating to Logical AND connection Input occurrs. (*1)
AND2	Orange	Logical AND input2 Indicator	- Lights up while high signal is input to T51. - Blinks when error relating to Logical AND connection Input occurrs. (*1)
FB	Orange	Feedback/Reset input Indicator	- Lights up in the following cases: -- With automatic reset while high signal is input to T33 -- With manual reset while hgh signal is input to T32. - Blinks when an error relating to Feedback/Reset input occurrs. (*1)
EI	Orange	Safety output indicator	- Lights up while Safety solid-state outputs (S14, S24) are in ON-state. - Blinks when an error relating to Safety solid-state output occurrs. (*1)
ED	Orange	Off-delayed Safety output Indicator	- Lights up while Safety off-delayed solid-state outputs (S44, S54) are in ON-state. - Blinks when an error relating to Safety off-delayed solid-state output occurrs.(*1)

Preset Switches

Change the value of the preset switches only when G9SX is disconnected from power supply.
The states of the preset switches come into effect when the power supply to G9SX turns on.

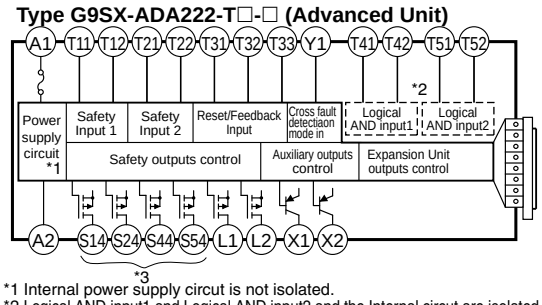
Name	Function	State/Value (position of switch)
Logical AND1 Connection Preset Switch	Sets Logical AND1 Connection Inputs to valid or invalid. (*2)	OFF (Invalid: default setting)/ AND1 (valid)
Logical AND2 Connection Preset Switch	Sets Logical AND2 Connection Inputs to valid or invalid. (*2)	OFF (Invalid: default setting)/ AND2 (valid)
Off-delay Time Preset Switch	Presets Off-delay time (duplicate) (*3), (*4)	For Type G9SX-ADA222-T150-□ 0 (default setting value) /10/20/30/40/50/60/70/80/90/100/ 110/120/130/140/150 (s) (*5) For Type G9SX-ADA222-T15-□ 0 (default setting value) /0.2/0.3/0.4/0.5/0.6/0.7/1/1.5/2/ 3/4/5/7/10/15 (s) (*5)

Note:
(*1) See 7 Fault Detection for details.
(*2) When operating G9SX using Logical AND Connection function, be sure to set the preset switch to AND (valid) position for the units which the logical input signal is input to. When the switch is set to OFF (invalid) position, it is detected as a fault.
(*3) Set both of the two Off-delay Time Preset Switches, one each on the front and back, to the same value.
(*4) Off-delay time duration of Expansion Unit (OFF-delay model) synchronize with the OFF-delay time duration set by Off-delay Time Preset Switch of Advanced Unit.
(*5) See following illustration for setting position of Off-delay Time Preset Switch. Make sure that the direction of cutting edge of preset switch is correctly pointed to the off-delay time value which must be set.



2 Internal Connection

Type G9SX-ADA222-T□-□ (Advanced Unit)



*1 Internal power supply circut is not isolated.
*2 Logical AND input1 and Logical AND input2 and the Internal circut are isolated.
*3 The Safety solid-state outputs,S14 - S54, are internally redundant, respectively.

4 Ratings and Specifications

Ratings

Item		TYPE G9SX-ADA222-T□-□
Power input	Rated supply voltage	24VDC
	Operating voltage range	-15% to +10% of rated supply voltage
	Rated power consumption	4 W Max. (See Note1)
Outputs	Safety solid-state output (See Note3) Off-delayed safety solid-state output (See Note3)	P channel MOS FET output Load current: Using 2 outputs or less: 1A DC Max. Using 3 outputs or more: 0.8A DC Max. (See Note4)
	Auxiliary output	PNP transistor output Load current: 100mA Max.

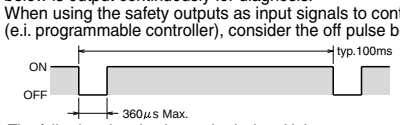
Specifications and Performance

Item		TYPE G9SX-ADA222-T□-□
Over voltage category (IEC/EN 60664-1)		II
Operating time (OFF to ON state)		50ms Max. (Safety input) 100ms Max. (Logical AND connection input) (See Note5,6)
Response time (ON to OFF state)		15 ms Max. (See Note5)
Input	Input current	10 mA min.
	ON voltage	11 V min.
	OFF voltage	5 V min.
	OFF current	1 mA max.
	Maximum wiring length	100 m max. (External connection impedance: 100ohm max. and 10 nF max.)
	Reset input time	**100 ms min.**
Output	ON-state residual voltage	3.0 V max. (safety output, auxiliary output)
	OFF-state leakage current	0.1 mA max. (safety output, auxiliary output)
Maximum cable length for logical connection inputs and Safety inputs		100m Max. (Permissible impedance : 100ohm Max. and 10nF Max.)
Number of units connected per one Logical connection output.		4 units Max. (See Note7)
Total number of units connected with Logical connection		20 units Max. (See Note7,8)
Number of units connected in series with Logical connection		5 units Max. (See Note7)
Accuracy of Off-delay time		Within plus or minus 5% of the set value
Reset input time		100ms Min.
Vibration resistance		Frequency: 10 to 55 to 10Hz, Amplitude: 0.375mm half amplitude (0.75mm double amplitude)
Mechanical shock resistance		300 m/s^2 (destruction), 100 m/s^2 (malfunction)
Ambient temperature		-10 to +55 ℃ (No freezing or condensation)
Ambient humidity		25 to 85 %RH
Terminal tightening torque		0.5Nm (Applicable only to TYPE G9SX-□-RT: screw terminal model)
Weight		Approx. 200 g

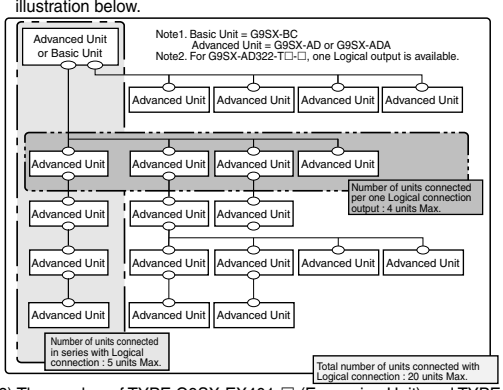
Isolation specifications

Item		TYPE G9SX-ADA222-T□-□
Insulation resistance	- Between Logical AND input1 terminals, and Power supply input terminals and other input and output terminals connected together.	20Mohm Min. (by 100VDC megger)
	- Between Logical AND input2 terminals, and Power supply input terminals and other input and output terminals connected together.	20Mohm Min. (by 100VDC megger)
	- Between all terminals connected together and DIN rail.	20Mohm Min. (by 100VDC megger)
Dielectric strength	- Between Logical AND connection1 terminals, and Power supply input terminals and other input and output terminals connected together.	500VAC for 1min
	- Between Logical AND connection2 terminals, and Power supply input terminals and other input and output terminals connected together.	500VAC for 1min
	- Between all terminals connected together and DIN rail.	500VAC for 1min

Note:
(1) Power consumption of loads not included .
(2) Ensure that the current exceeds the minimum applicable load of the device connected.
(3) While safety outputs are at its ON state, signal sequence shown below is output continuously for diagnosis.
When using the safety outputs as input signals to control devices (e.i. programmable controller), consider the off pulse below.



(4) The following derating is required when Units are mounted side-by-side.
- 0.4 A max. load current
(5) When multiple units are connected by logical connection, the total operating/response time is an accumulation of the operating/response time connected.
(6) Required time for safety solid-state output to turn ON, after necessary inputs turn ON.
(7) For details of the system with logical connection refer to the illustration below.



(8) The number of TYPE G9SX-EX401-□ (Expansion Unit) and TYPE G9SX-EX041-T-□ (Expansion Unit, Off-delayed model) not included.

Settings indication (at power on)

Settings for G9SX can be checked by indicators for approx 3 seconds after power on.
During the settings indication term, ERR indicator will light up, however the auxiliary error output will remain off.

Indicator	Items	Setting position	indicator status	Setting mode	Setting status
T1	Cross fault detection mode	Y1 terminal	light up	detection mode	Y1 = open
			not lit	non-detection mode	Y1 = 24VDC
FB	Reset mode	T32 or T33 terminal	light up	manual reset mode	T33 = 24VDC
			not lit	auto reset mode	T32 = 24VDC
AND1	Logical AND connection input mode	Logical AND connection preset switch1	light up	enable Logical AND input	'AND1'
			not lit	disable Logical AND input	'OFF'
AND2	Logical AND connection input mode	Logical AND connection preset switch2	light up	enable Logical AND input	'AND2'
			not lit	disable Logical AND input	'OFF'

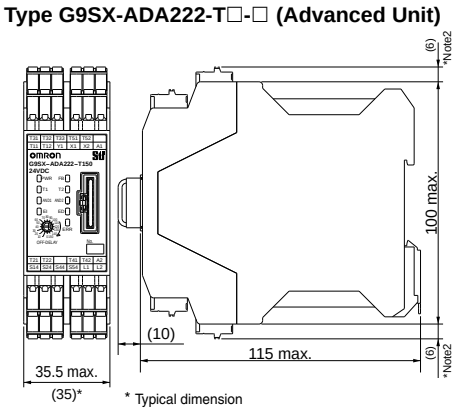
Relation between each Logical AND connection preset switch and Safety output state

Relation between each logical AND connection switch setting and conditions for Safety output in the ON state is as follows.

Logical AND connection preset switch setting		Conditions for Safety output ON state		
T41/T42	T51/T52	Safety Input	Logical Input1	Logical Input2
OFF	OFF	ON	OFF	OFF
AND1	OFF	ON	ON	OFF
OFF	AND2	ON	OFF	ON
AND1	AND2	ON	ON	ON

3 Dimensions

Type G9SX-ADA222-T□-□ (Advanced Unit)



* Typical dimension
*Note1 Above outline drawing is for -RC terminal type.
*Note2 For -RC terminal type only.

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 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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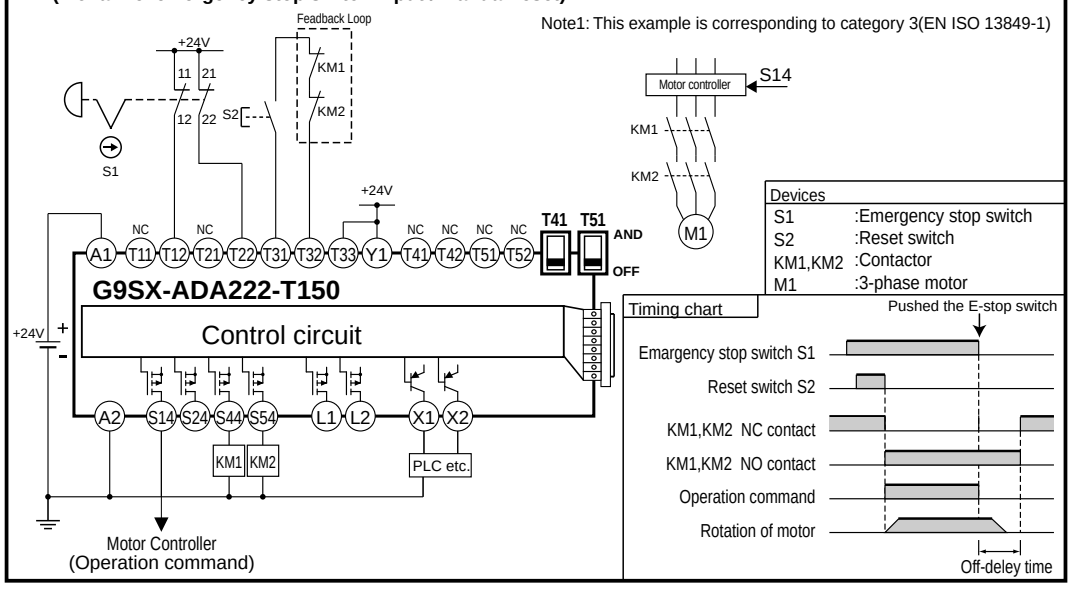
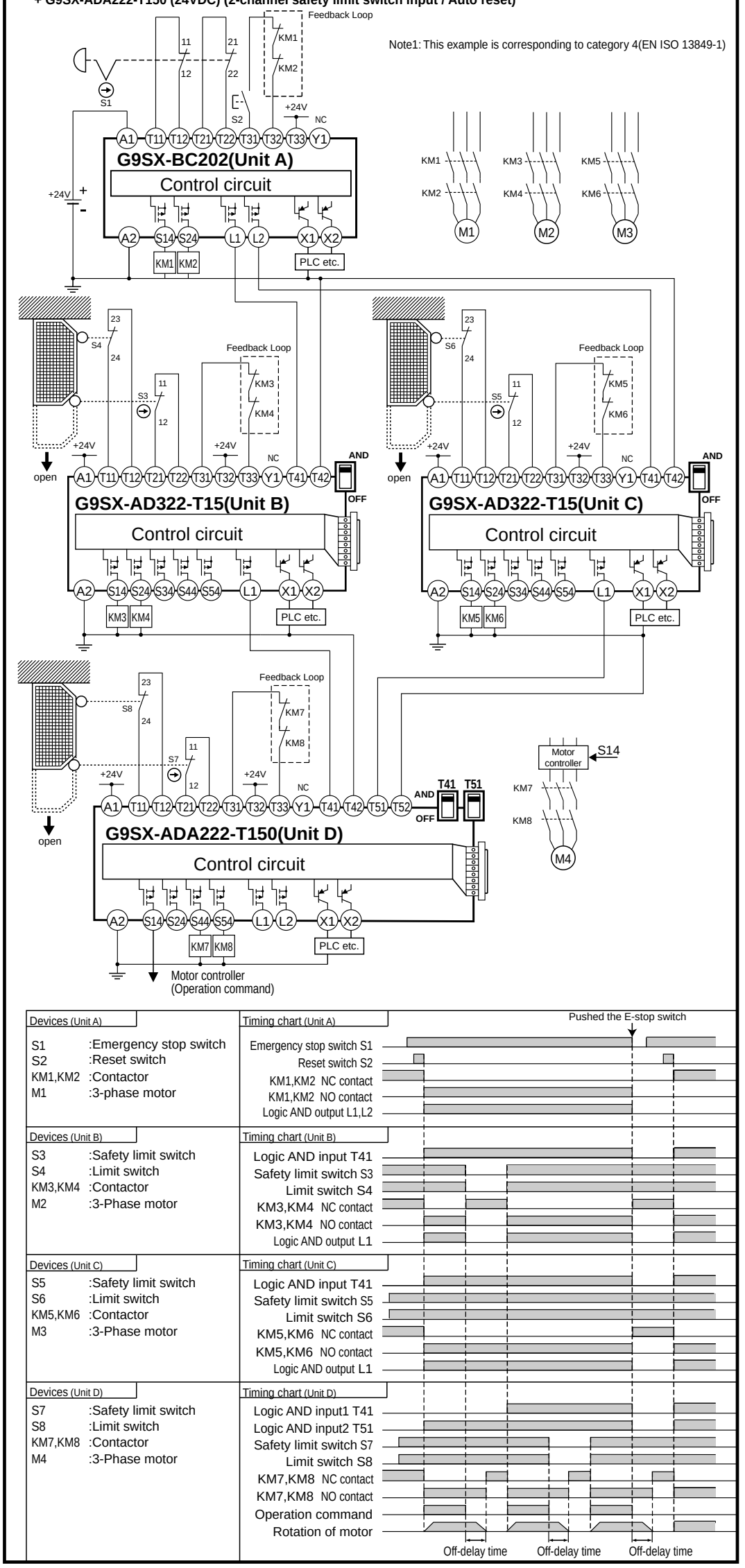
5 Examples of application

Application and timing chart

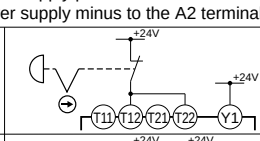
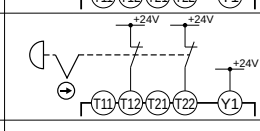
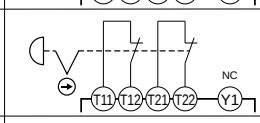
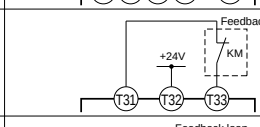
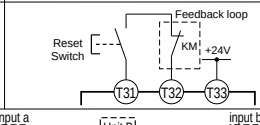
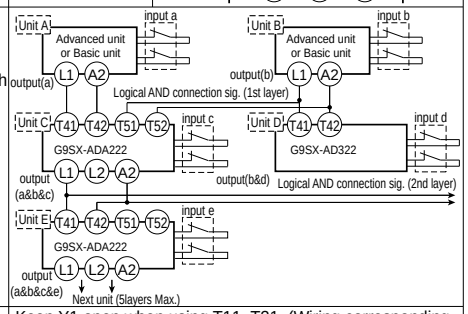
G9SX-ADA222-T150 (24VDC)
(2-channel emergency stop switch input / Manual reset)



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)

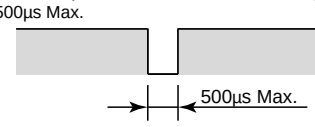


Wiring of inputs and outputs

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.	Using 1 safety input channel 
			Using 2 safety input channels (cross fault detection OFF) 
Safety input 2	T21, T22		Using 2 safety input channels (cross fault detection ON) 
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.	Auto reset 
		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.	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.

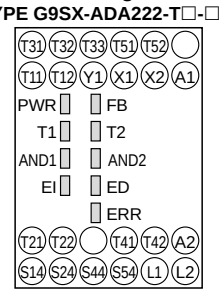
Connecting Safety Sensors and G9SX

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 : 500µs Max.



Terminal arrangement and LED indicators

TYPE G9SX-ADA222-T□-□ (Advanced Unit)



6 Performance Level and Safety category of EN ISO 13849-1

The G9SX can be used up to PL =e and Category 4 required by EN ISO 13849-1 European standard. Refer to the following link for the Safety-relay characteristic data:
http://www.fa.omron.co.jp/safety_6en/
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, make sure the conformity of the 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.
3) When connecting Safety sensor with G9SX, use TYPE 4 safety sensor.
4) Input the signal through a NC contact of the contactor to Feedback/Reset input (T31-T32 for manual reset or T31-T33 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 other 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.
Light up	T1 Blink	Faults involved with Safety input 1	1) Failures involving the wiring of Safety input 1 2) Incorrect setting of Cross fault detection mode. 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.
		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. * 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. 3) 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 wiring to S44 and S54 2) Confirm 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 3) Failures of the parts of the circuits of Logical AND connection input1 or 2	1) Check the wiring to T41 and T42 (T51 and T52) * Make sure that the wiring length for T41, T42, T51, T52 terminals is less than 100 meters, respectively * Make sure that the Logical AND connection signal is branched for less than 4 units. 2) Confirm the set value of the Logical AND connection preset switch. 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 / and 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.