# G9SX FLEXIBLE SAFETY UNIT

## The logical alternative in safety control

» Flexibility in application

» Clear diagnosis

» Easy maintenance

Advanced Industrial Automation

OMRON

# The flexible way to design-in safety

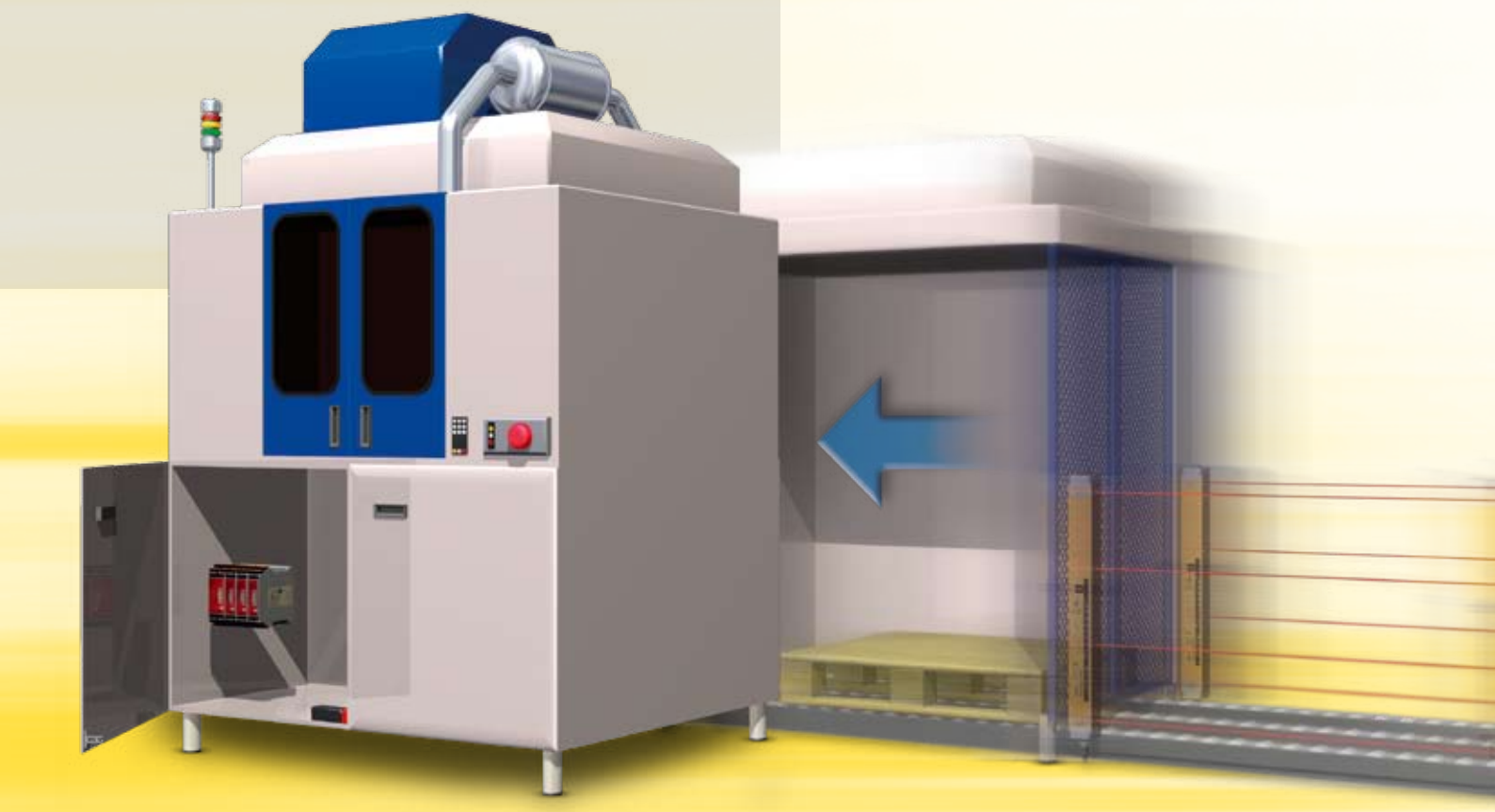
*Omron's G9SX is an innovative flexible safety unit that provides a clever solution for partial or complete safeguarding of a machine control system. Using microprocessor technology, the G9SX provides a transparent, logical connection throughout your system that enables you to shut down any segmentation according to your machine's safety layout. Key industries for G9SX applications are the packaging, semiconductor, moulding and food processing industries.*

The G9SX flexible safety unit provides unique AND connections for easy, flexible and expandable safety machine control:

Modular - It allows the machine safety function to be split into separate function blocks for easy diagnosis and maintenance.

Expandable - Existing safety controls with G9SX can be easily expanded by using additional G9SX units connected by the logical AND function.

Flexible - The logical AND function offers flexibility for modular machines, while safety control can be set up individually in every module. The end result is that modules of machines can be easily connected by using the AND function to set up the complete safety function.



# The G9SX flexible safety unit range

### Basic unit G9SX-BC

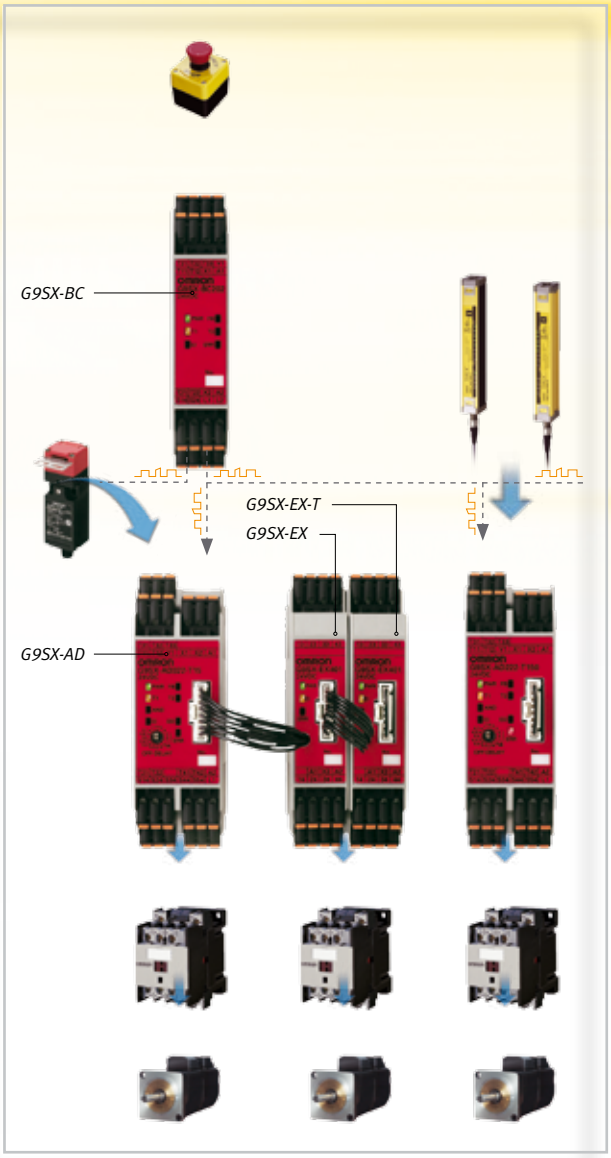
- 1 two-channel safety input
- E-Stop applications
- 2 solid state safety outputs (instantaneous)
- 2 logical “AND” outputs
- 2 auxiliary outputs
- 6 LED indicators
- 22.5 mm wide housing

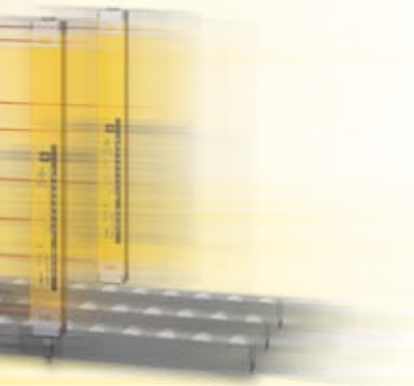
### Advanced units G9SX-AD and G9SX-ADA

- 1 two-channel safety input
- Up to 3 solid state safety outputs (instantaneous) and 2 solid state safety outputs (OFF-delayed up to 15 sec or 150 sec)
- 1 logical “AND” input for G9SX-AD
- 2 logical “AND” inputs for G9SX-ADA
- 1 logical “AND” output for G9SX-AD
- 2 logical “AND” outputs for G9SX-ADA
- 2 auxiliary outputs
- 8 LED indicators
- 35 mm wide housing

### Expansion unit G9SX-EX

- 4 safety relay outputs (instantaneous) or 4 safety relay outputs (OFF-delayed, OFF-delay is controlled by connected Advanced unit)
- Combination of up to 5 Expansion units is possible to give 25 safety outputs in total
- 1 auxiliary output
- 3 LED indicators
- 22.5 mm wide housing



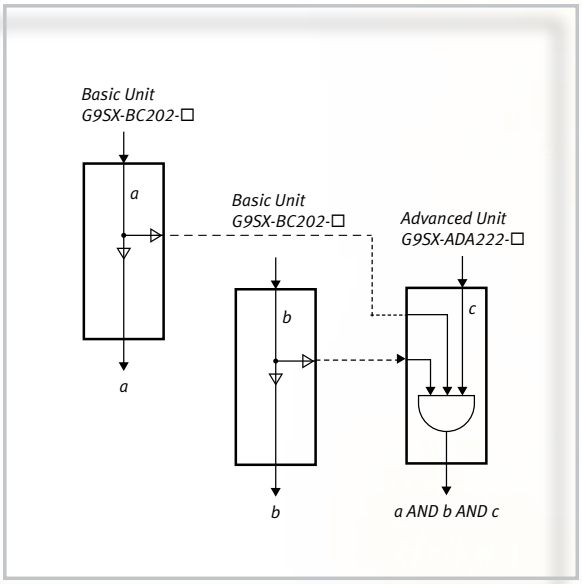
# Features and benefits

## Flexibility and expandability in applications

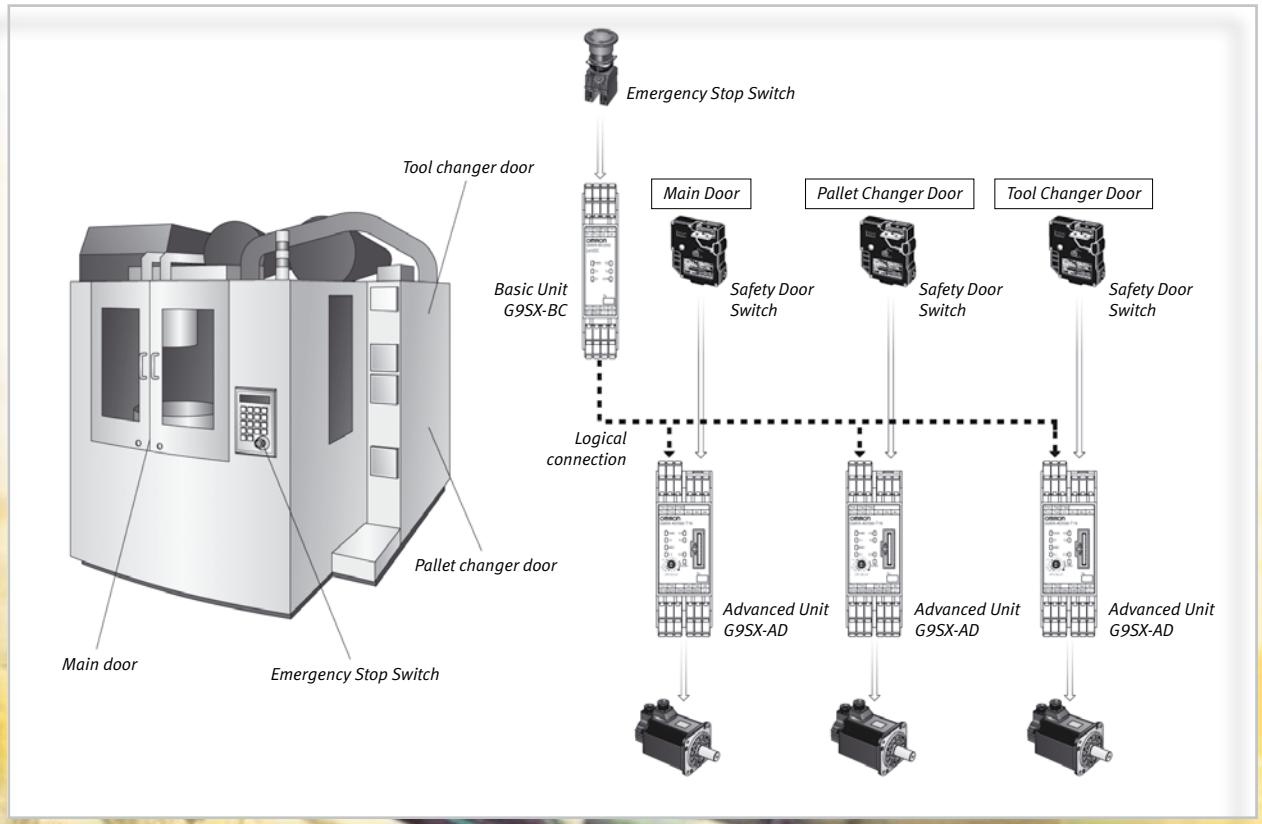
The G9SX-EX expansion unit has four safety relay outputs. Up to five expansion units can be easily connected together per switching path to provide up to 25 outputs if required (20 relay outputs and five electronic outputs), giving you the highest system integrity and fail-safe operation for your system.

## Unique! Logical connection

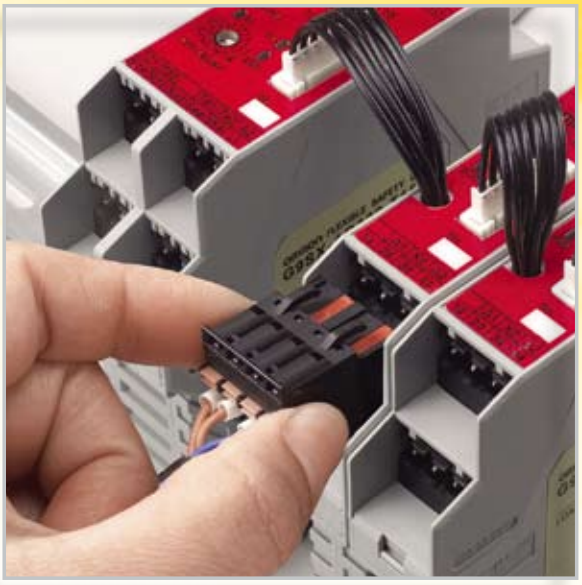
The G9SX uses microprocessor technology to manage a unique, hardwire-based dynamic 'safety carrier signal'. The 'safety carrier signal' produces an easy parallel-wired structure of logical AND connections to determine a partial or complete shutdown. The 'safety carrier signal' provides a continuous system check to ensure safety integrity at all times.
With the logical connection feature, even complex machines can be easily segmented for more precise shut down during faultfinding or machine maintenance, with minimum impact on downtime and productivity. In total, up to 20 units can be combined using the logical AND connection. Depending on the safety system, up to five tiers can be set up for individual stop of machine parts. A maximum of four logical inputs can be used together with every logical output from Basic units or Advanced units.




In a machining center, for example, when the Emergency Stop Switch is pressed, the entire machine will stop. When a door is opened, only the corresponding part will be stopped.
So the safety system of this machine has two tiers as shown in the drawing below.




Machining center example.



Plug-in wiring connectors are quick and easy to remove, enabling fast maintenance.



Terminals can be either screw-type or screw-less spring-type.

### Extended operating life through solid state outputs

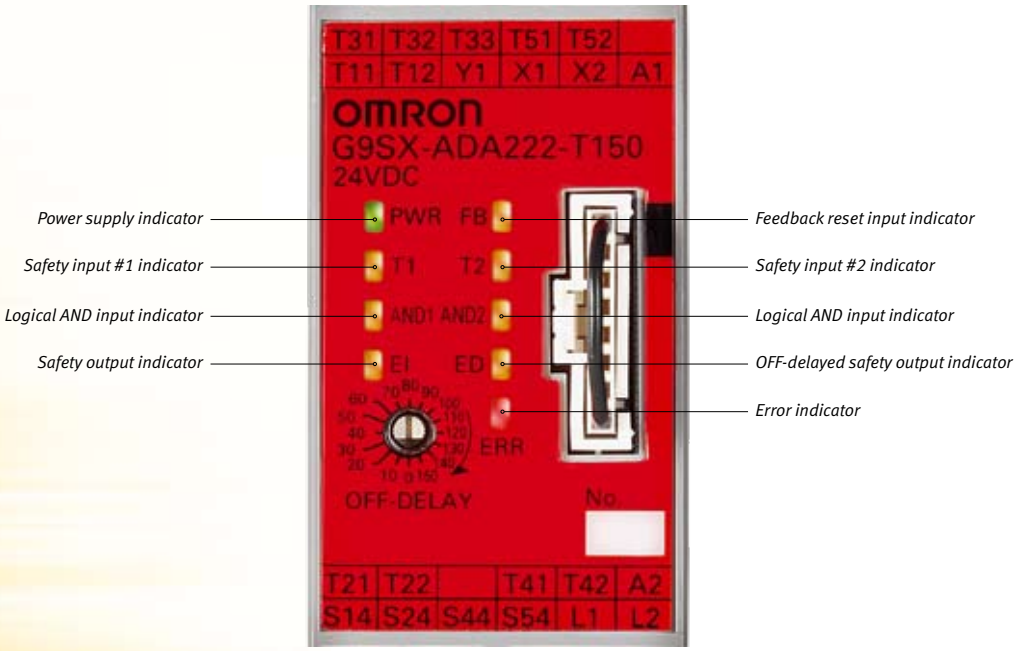
Unlike conventional relays, the safety outputs of the G9SX-BC and G9SX-AD are solid state, so there are no mechanical parts to wear out. This design is very effective for frequent switching cycles.

### Advanced diagnostics and troubleshooting functionality

The G9SX features a number of LEDs that indicate the entire status of the system, including power supply, safety inputs and outputs, feedback input, logical AND connection, and error status. This provides a clear image of what's happening for easy diagnostics and troubleshooting. The auxiliary outputs highlight the system status (output and error) to your control system to provide full transparency and displays where the fault area occurs.

### Easy connectivity

The G9SX offers a choice of terminals: a screw-less spring-type or screw type. These terminals feature plug-in wiring connectors that are easily detachable for fast and easy maintenance.



# Flexible safety unit

G9SX-family modules can be connected by a logical "AND" function to implement partial/global stopping of a machine. Solid-state outputs, detailed LED diagnosis and clever feedback signals help to keep maintenance easy. The line-up is completed by expansion units with safe timing functions.

- Clear and transparent segmentation of safety functions by use of unique "AND" connection
- Solid-state outputs for long life and relay outputs in extension box available
- Detailed LED indications enable easy diagnosis
- Clever feedback signals for easy maintenance
- Category 4 according to EN954-1 and SIL 3 according to EN 61508

## Ordering information

### Advanced unit 1 logical AND input

| Safety outputs | | Auxiliary outputs | No. of input channels | Max. OFF-delay time *1 | Rated voltage | Terminal block type | Model |
|---|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed | | | | | | |
| P channel MOS-FET transistor output | P channel MOS FET transistor outputs | PNP transistor outputs | 1 or 2 channels | 0 to 15 s in 16 steps | 24 VDC | Screw terminals | G9SX-AD322-T15-RT |
| | | | | | | Cage clamp terminals | G9SX-AD322-T15-RC |
| | | | | 0 to 150 s in 16 steps | | Screw terminals | G9SX-AD322-T150-RT |
| | | | | | | Cage clamp terminals | G9SX-AD322-T150-RC |

*1 The OFF-delay time can be set in 16 steps as follows: T15: 0/0.2/0.3/0.4/0.5/0.6/0.7/1/1.5/2/3/4/5/7/10/15 s, T150: 0/10/20/30/40/50/60/70/80/90/100/110/120/130/140/150

### Advanced unit 2 logical AND inputs

| Safety outputs | | Auxiliary outputs | No. of input channels | Max. OFF-delay time *1 | Rated voltage | Terminal block type | Model |
|---|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed | | | | | | |
| P channel MOS-FET transistor output | P channel MOS FET transistor outputs | PNP transistor outputs | 1 or 2 channels | 0 to 15 s in 16 steps | 24 VDC | Screw terminals | G9SX-ADA222-T15-RT |
| | | | | | | Cage clamp terminals | G9SX-ADA222-T15-RC |
| | | | | 0 to 150 s in 16 steps | | Screw terminals | G9SX-ADA222-T150-RT |
| | | | | | | Cage clamp terminals | G9SX-ADA222-T150-RC |

*1 The OFF-delay time can be set in 16 steps as follows: T15: 0/0.2/0.3/0.4/0.5/0.6/0.7/1/1.5/2/3/4/5/7/10/15 s, T150: 0/10/20/30/40/50/60/70/80/90/100/110/120/130/140/150

### Basic unit

| Safety outputs | | Auxiliary outputs | No. of input channels | Rated voltage | Terminal block type | Model |
|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed | | | | | |
| P channel MOS FET transistor output | --- | PNP transistor output | 1 or 2 channels | 24 VDC | Screw terminals | G9SX-BC202-RT |
| | | | | | Cage clamp terminals | G9SX-BC202-RC |

### Expansion unit

| Safety outputs | | Auxiliary outputs | OFF-delay time | Rated voltage | Terminal block type | Model |
|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed | | | | | |
| 4 PST-NO (contact) | --- | 1 (solid state) PNP transistor output | --- | 24 VDC | Screw terminals | G9SX-EX401-RT |
| | | | | | Cage clamp terminals | G9SX-EX401-RC |
| --- | 4 PST-NO (contact) | | Synchronized with G9SX-AD - unit | | Screw terminals | G9SX-EX041-T-RT |
| | | | | | Cage clamp terminals | G9SX-EX041-T-RC |

## Specifications

### Power input

| Item | G9SX-AD322-□ G9SX-ADA222-□ | G9SX-BC202-□ | G9SX-EX-□ |
|---|---|---|---|
| Rated supply voltage | 20.4 to 26.4 VDC (24 VDC -15% +10%) | | |

### Inputs

| Item | G9SX-AD322-□ G9SX-ADA222-□ | G9SX-BC202-□ |
|---|---|---|
| Safety input | Operating voltage: 20.4 VDC to 26.4 VDC, internal impedance: approx. 2.8 kΩ | |
| Feedback/reset input | | |

### Outputs

| Item | G9SX-AD322-□ G9SX-ADA222-□ | G9SX-BC202-□ |
|---|---|---|
| Instantaneous safety output OFF-delayed safety output | P channel MOS FET transistor output Load current: Using 2 outputs or less: 1 A DC max. Using 3 outputs or more: 0.8 A DC max. | P channel MOS FET transistor output Load current: Using 1 output: 1 A DC max. Using 2 outputs: 0.8 A DC max. |
| Auxiliary output | PNP transistor output Load current: 100 mA max. | |

For full specifications and additional models please refer to www.omron-industrial.com
Safety network and units - Cat.-No. J150-E2-04

### Expansion unit

| Item | G9SX-EX-□ |
|---|---|
| Rated load | 250 VAC, 3A / 30 VDC, 3A<br>(resistive load) |
| Rated carry current | 3 A |
| Maximum switching voltage | 250 VAC, 125 VDC |

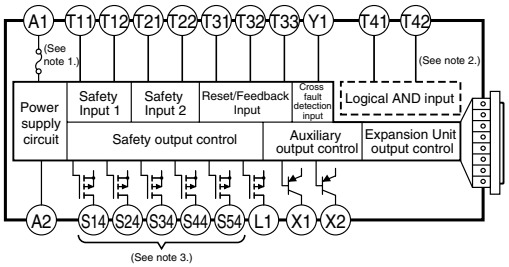
### Characteristics

| Item | | G9SX-AD322-□<br>G9SX-ADA222-□ | G9SX-BC202-□ | G9SX-EX-□ |
|---|---|---|---|---|
| Operating time (OFF to ON state) | | 50 ms max. (Safety input: ON)<br>100 ms max.<br>(Logical AND connection input: ON) | 50 ms max. (Safety input: ON) | 30 ms max. |
| Response time (ON to OFF state) | | 15 ms max. | | 10 ms max. |
| Durability | Electrical | --- | | 100,000 cycles min. |
| | Mechanical | --- | | 5,000,000 cycles min. |
| Ambient temperature | | -10 °C +55 °C (with no icing or condensation) | | |

## Connections

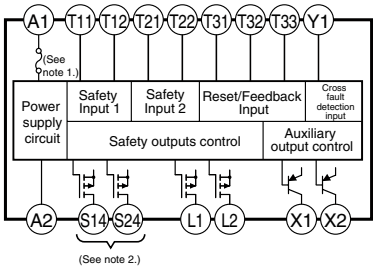
### Internal Connection

#### G9SX-AD322-□ (Advanced Unit)



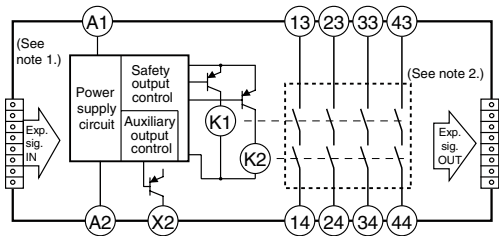

Note: 1. Internal power supply circuit is not isolated.
2. Logical AND input is isolated.
3. Outputs S14 to S54 are internally redundant.

#### G9SX-BC202-□ (Basic Unit)



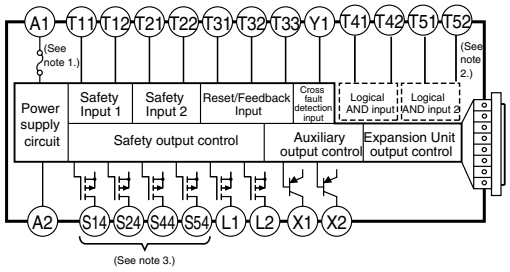

Note: 1. Internal power supply circuit is not isolated.
2. Outputs S14 to S24 are internally redundant.

#### G9SX-EX401-□/G9SX-EX041-T-□ (Expansion Unit / Expansion Unit OFF-delayed model)




Note: 1. Internal power supply circuit is not isolated.
2. Relay outputs are isolated.

#### G9SX-ADA222-□ (Advanced Unit)




Note: 1. Internal power supply circuit is not isolated.
2. Logical AND input are isolated.
3. Outputs S14 to S54 are internally redundant.

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