

Safety Relay Unit

G9SE Series

Compact and Simple Safety Control



» Simple wiring using screw-less terminals

» Slim design to save mounting space

» Easy maintenance with status indicators

G9SE Series

nance

For various safety input devices

A wide variety of safety input devices such as emergency stop switches, door switches, and light curtains can be connected.

OFF-delayed safety output models are also available.

2 safety outputs
G9SE-201

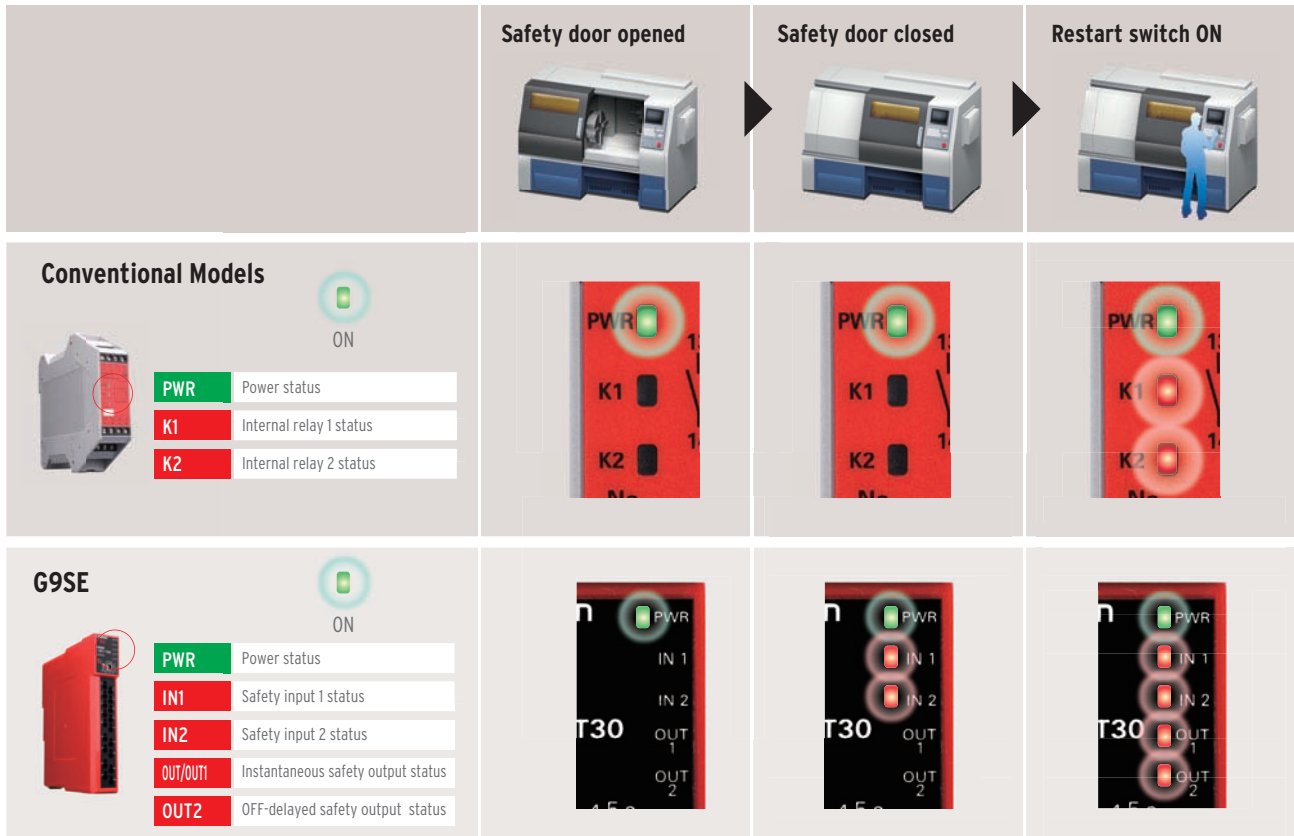
4 safety outputs
G9SE-401

2 safety outputs with OFF-delay
G9SE-221-T05/T30



Faster troubleshooting with status indicators

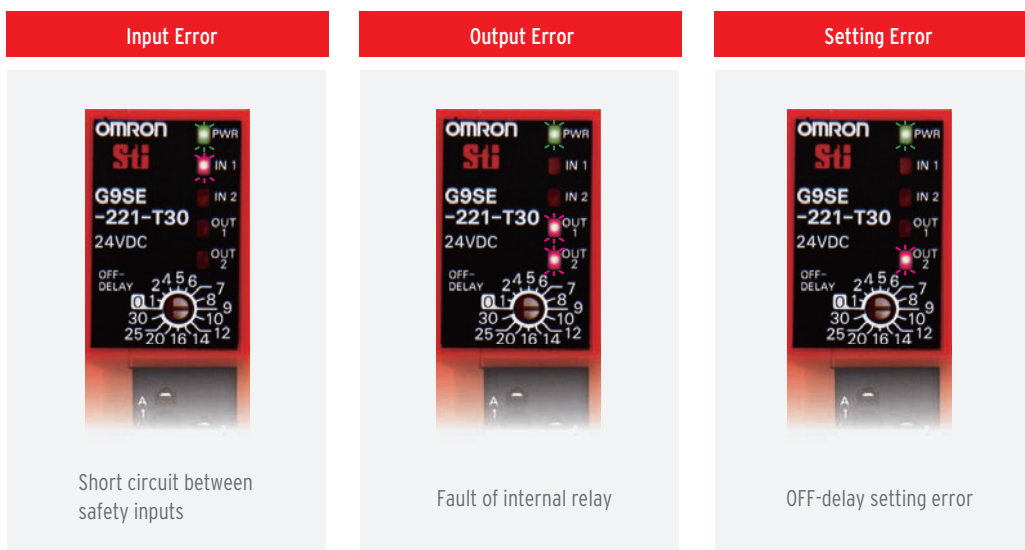
The indicators of conventional safety relay units only indicate the operating status of the internal relays (K1/K2), and it is difficult to check the operation or connection of safety input devices. The new intuitive LED indicators of the G9SE show the operating status of safety inputs and outputs, enabling faster and more accurate troubleshooting when the equipment stops.



When the G9SE detects an error, such as input wiring, an indicator will blink to show where the error has occurred. This minimizes downtime to identify the cause when the equipment stops.



Blink



Shrink-wrap machine



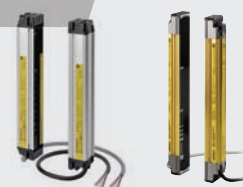
Safety circuit for machine

Safety relay unit
G9SE



Detecting entry

Safety light curtain
F3SJ series



Emergency stop for machine

Emergency stop switch
A22E



Elevator/escalator



Safety circuit for machine

Safety relay unit
G9SE



Door position and open/close detection

Safety limit switch
D4B-□N
Small safety limit switch
D4N/D4F



Emergency stop for machine

Emergency stop switch
A22E



Specifications

Ratings

Power Input

Item	Model	G9SE-201	G9SE-401	G9SE-221-T□
Rated supply voltage		24 VDC		
Operating voltage range		-15% to 10% of rated supply voltage		
Rated power consumption *1		3 W max.	4 W max.	

Outputs

Item	Model	G9SE-201	G9SE-401	G9SE-221-T□
Safety output OFF-delayed Safety output		Contact output 250 VAC 5 A 30 VDC 5 A (resistive load)		
Auxiliary output		PNP transistor output Load current: 100 mA DC max.		

Characteristics

Item		Model	G9SE-201	G9SE-401	G9SE-221-T□
Operating time (OFF to ON state) *2			100 ms Max. *3		
Response time (ON to OFF state) *4			15 ms Max.		
Accuracy of OFF-delay time			—		Within plus or minus 10% of the set value
Inputs	Input current		5 mA Min.		
	ON voltage		11 VDC Min.		
	OFF voltage		5 VDC Max.		
	OFF current		1 mA Max.		
	Maximum cable length		100 m Max.		
	Reset input time		250 ms Min.		
Contact outputs	Contact resistance *5		100 mΩ		
	Mechanical durability		5,000,000 operations Min.		
	Electrical durability		50,000 operations Min.		
	Switching specification Inductive load (IEC/EN60947-5-1)		AC15: 240 VAC 2 A DC13: 24 VDC 1.5 A		
	Minimum applicable load		24 VDC 4 mA		
	Conditional short-circuit current (IEC/EN60947-5-1)		100A *6		
Pollution degree			2		
Over voltage category (IEC/EN60664-1)			Safety output: Class III, the others: Class II		
Insulation specification	Impulse withstand voltage (IEC/EN60947-5-1)	Between input and output	6 kV		
		Between different poles of output	6 kV (between 13-14/23-24 and 33-34/43-44 (37-38/47-48)) 4 kV (between 13-14 and 23-24, between 33-34 (37-38) and 43-44 (47-48))		
	Dielectric strength	Between input and output	2,200 VDC		
		Between different poles of output	1,500 VAC		
	Insulation resistance		100 MΩ		
	Vibration resistance *7			Frequency:10 to 55 to 10 Hz Amplitude:0.35 mm half amplitude (0.7 mm double amplitude)	
Mechanical shock resistance *7	Destruction		300 m/s²		
	Malfunction		100 m/s²		
Surrounding Air Temperature			-10 to 55°C (No freezing or condensation)		
Ambient humidity			25% to 85%RH		
Degree of protection			IP20		
Weight			approx. 150 g	approx. 180 g	

*1 Power consumption of loads not included.

*2 The operating time is the time it takes for the safety contact to close after the safety inputs and feedback-reset input are turned ON. Not includes bounce time.

*3 This is in normal operation. When executing non-regular self-diagnosis for Safety output circuit, G9SE operating time become 500 ms max..

*4 The response time is the time it takes for the safety main contact to open after the safety input is turned OFF. Includes bouncetime.

*5 This is initial value using the voltage-drop method with 1A at 5VDC.

*6 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.

*7 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))

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	
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. *1	Auto reset	
		To set Safety outputs in ON state, the signal input to T32 must change from OFF state to ON state, and then to OFF state. Otherwise Safety outputs cannot be in ON state.	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-delayed 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. *2 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.		
Auxiliary output	X1	Outputs a signal of the same logic as Safety 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.

Application Examples

Application Overview

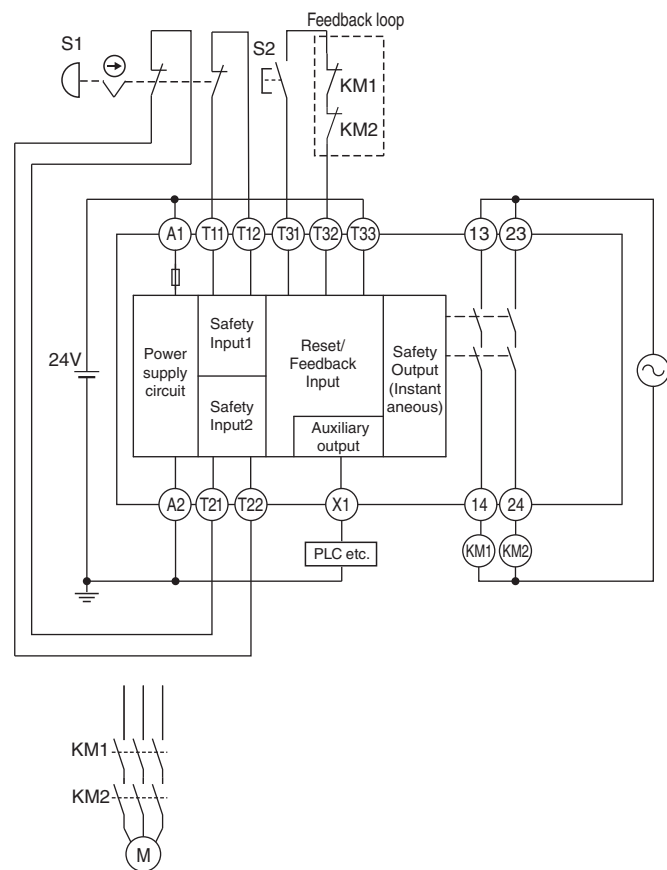
- Immediately removes power to Motor M when Emergency Stop Switch S1 is pressed.
- The power to Motor M is kept removed until Emergency Stop Switch S1 is released and Reset Switch S2 is pressed.

Evaluation example

PL/safety category	Model	Stop category	Reset
PLe/4 equivalent	Emergency stop pushbutton :A22E-M-02 (2NC contact) Push Button Switch (from Annex C of ISO 13849-1) Safety Relay Unit :G9SE-201 Contactor of rated load (from Annex C of ISO 13849-1)	0	Manual

Note: The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

Wiring Example



Timing Chart



Device

- S1: Emergency stop switch
S2: Reset switch
KM1, KM2: Contactor
M: 3-phase motor

Application Overview

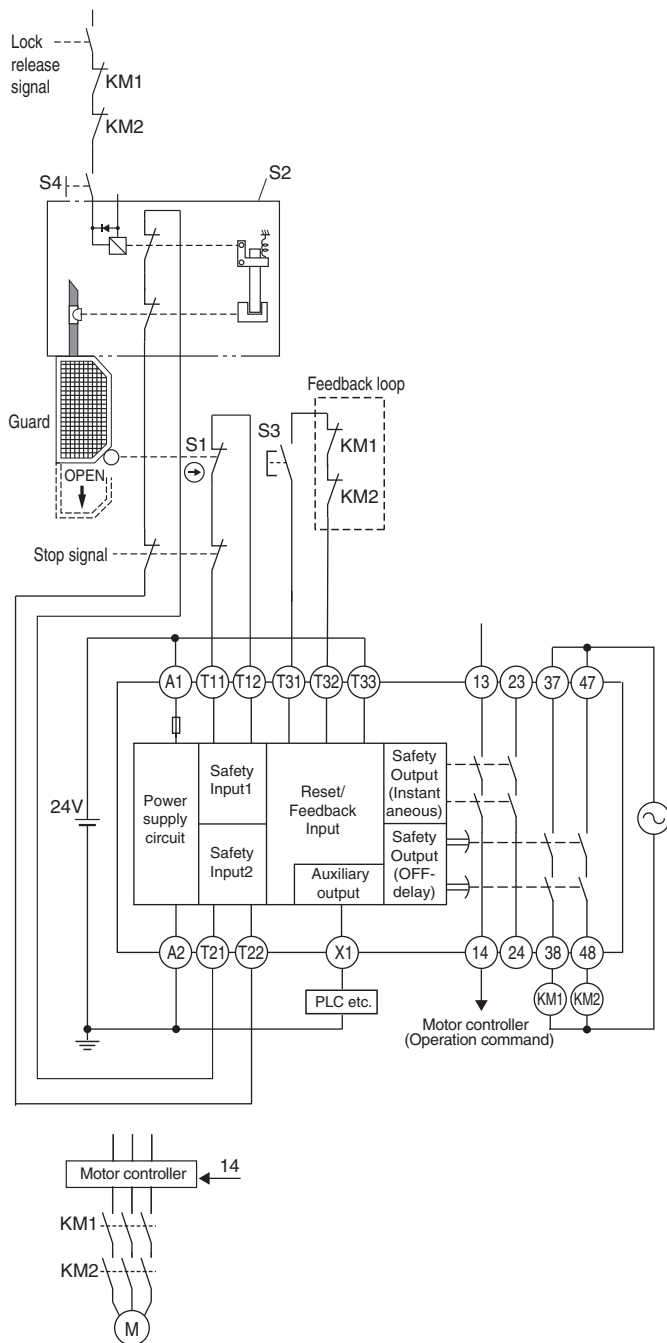
- After OFF-delay time removes power to Motor M when Limit Switch S1 and Guard Lock Safety Door Switch S2 detect the opening of the Guard.
- When the NC contacts on both KM1 and KM2 are closed and the lock release signal is input, the Guard can be opened while Lock Release Switch S4 is pressed.
- The power to Motor M is kept removed until the Guard is closed and locked and Reset Switch S3 is pressed.

Evaluation example

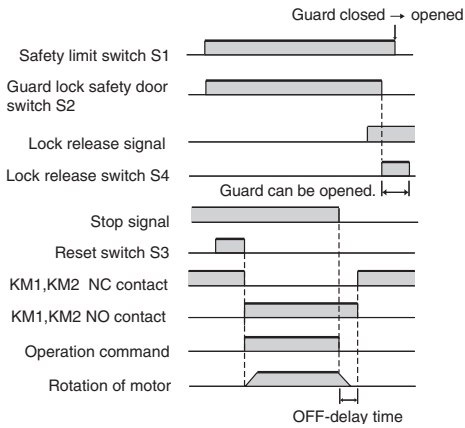
PL/safety category	Model	Stop category	Reset
PLe/4 equivalent	Safety Limit Switch :D4N-□□20 Guard Lock Safety Door Switch:D4SL-N□□□A-□(Mechanical lock) Push Button Switch(from Annex C of ISO 13849-1) Safety Relay Unit :G9SE-221-T05 Contactor of rated load (from Annex C of ISO 13849-1)	1	Manual

Note: The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

Wiring Example



Timing Chart

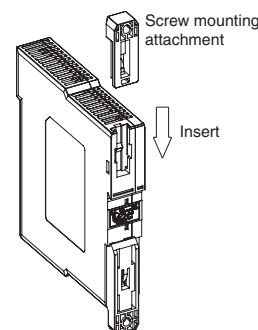


Device

- S1: Safety limit switch
- S2: Guard lock safety door switch(Mechanical Lock)
- S3: Reset switch
- KM1, KM2: Contactor
- M: 3-phase motor

Precautions for Correct Use

- (1) 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.
- (2) 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 °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 current higher than 3 A. If the output current is 3 A or more, make sure that there is a minimum distance of 10mm each between all adjacent G9SE units.
- (6) DIN rail mounting
Mount G9SE 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 G9SE.
- (7) Wire correctly according to Wiring.
- (8) Use cables with length less than 100 m to connect to Safety Inputs, Feed-back/Reset inputs, respectively.
- (9) G9SE may malfunction due to electro-magnetic disturbances. Be sure to connect the negative terminal of 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□ : 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□)
 1. Set the time duration of OFF-delay to an appropriate value that does not cause the loss of safety function of system.
 2. Set both of the two O on the front and back, to the same value. When setting the de After setting, make sure G9SE operating time is correct.
- (14) To determine safety distance to hazards, take into account the delay of Safety outputs caused by the following time:
 1. Response time
 2. Preset off-delay time and accuracy of off-delay time
- (15) 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.



Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

- (a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.
- (b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

Limitation on Liability; Etc.

OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of 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.

Programmable Products.

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions.

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.