| OTRROГ |  |
| :---: | :---: |
| Type G9SX-NSA222-T03- |  |
| Type G9SX-NS202- $\square$ |  |
| Non-contact Door Switch Controller |  |
| English | USER'S MA |
| Thank you for purchasing G9SX-NS $\square$ Non-contact Door Switch Controller. |  |
| Please read and understand this manual before using Keep this manual ready to use whenever needed. Only qualified d person trained in professional electricaltechnique should handle GgSX-NSI. |  |
|  |  |
| 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. |  |
| OMRO | Corporation |


| EU Declaration of Conformity <br> OMRON declares that G9SX-NS $\square$ is in conformity with the requirements of the following EU Directives: <br> - Machinery Directive 2006/42/EC <br> EMC Directive 2014/30/EU |
| :---: |
|  |  |
|  |
| G9SX-NS $\square$ is designed and manufactured in accordance with the following standards: <br> - EN ISO13849-1:2015 <br> Cat. 3 PL d (with D40A) / Cat. 4 PL e (with D40Z) <br> - IEC/EN61508 SIL3, <br> - IEC/EN61000-6-2, - IEC/EN61000-6-4, <br> - UL508, <br> - UL1998, <br> CAN/CSA C22.2 No. 142 |
| Safety Precautions |


| Meanings of Signal Words <br> The following signal words are used in this manual. |  |
| :---: | :---: |
| $\triangle$ WARNING | Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage. |
| Meaning of Alert Symbols <br> The following alert symbols are used in this manual. |  |
| Q Indi | Indicates prohibited actions. |
| I) Indi | Indicates mandatory actions. |






 (2) Handle with care D. DTot tot the ground or expose to oxcessiviv vibation or
 Do no store or use in

 5) Weth vibivaion or mechaniicalas shosks out of the rated values, 7 In the eatmosshere containining dust, saline or metal powder. Mounting MXX NS Io DIN rails with atachments (TYPE PFP-M, not










a) Remove the termination connector from the receptacle on
b) Insert the head of the connecting cable of Expansion Unit to the
c) Set the eemination connector t. the receplacle on the Expansion Unitat

sockets and pluss pere locked tirmy



 10) Lot caucical cone tone losion of satieteen function of system.

1) Logical connection between Units:
 2) Comnect Logicial Io onnection outputs appropriately to Logical AND
 not degrade the esatity function ot toe system. (1) To determine satety disistanceton hazardscs stitem into account the 1)
2) Responsest time of statill innuts
3) 2) Resonse time of Non-cornacat door switch (Q40AA 4) See also "Roting and s

Ge surx to connect the terminal Al Ao to orround.






1 Appearance and Explanation of Each Parts



## 4 Ratings and Specifications

| Ratings |  |
| :---: | :---: |
| Item |  |
| Power input | Rated supply votage |
|  | Rated power consumption (See Note1) |
| inputs | Emergencr stop input |
| Outputs |  |
|  | Auxiliary output |

## 

Perating Voltage: 20.4vDC to $26.4 \mathrm{VDC}, 3 \mathrm{~W} \mathrm{Max}$


## Specifications and Performance

| Item |  |  | TYPE G9SX-NSA222-T03-■ |  |  | TYPE G9SX-NS202-] |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Over voltage category (IEC/EN 60664-1) |  |  | 11 |  |  |  |
| Operating time <br> (OFF to ON state)(See Note6,7) |  | Safety input | $50 \mathrm{~ms} \mathrm{Max}$. |  |  |  |
|  |  | Logical AND connection input | 100 ms Max . |  |  |  |
|  |  | Non-contact door switch input | $100 \mathrm{~ms} \mathrm{Max}$. |  |  |  |
| Response time (ON to OFF state) (See Note6) |  | Safety input | 15 ms Max. |  |  |  |
|  |  | Logical AND connection input | 15 ms Max . |  |  |  |
|  |  | Non-contact door switch input | $20 \mathrm{~ms} \mathrm{Max}$. ( (See note8)3.0V Max. |  |  |  |
| ON-state residual voltage |  |  |  |  |  |  |
| OFF-state L | akage current |  | 0.1 ma Max. |  |  |  |
| Maximum cable length for Logical connection input, Safety inputs and Non-contact Door Switch input |  |  | 100m Max. <br> (Permissible impedance of inputs : 100ohm Max and 10nF Max) |  |  |  |
| Number of units connected per one Logical connection output. |  |  | 4 units Max. (See Note9) |  |  |  |
| Total number of units connected with Logical connection |  |  | 20 units Max. (See Note9, 10) |  |  |  |
| Number of units connected in series with Logical connection Total number of non-contact door switches |  |  | 5 units Max. (See Note9) |  |  |  |
|  |  |  | Within plus or minus 5\% of the set value |  |  |  |
| Accuracy of Off-delay time |  |  |  |  |  |  |
| Reset input time |  |  | $100 \mathrm{~ms} \mathrm{Min}$. |  |  |  |
| Vibration resistance |  |  | Frequency: 10 to 55 to 10 Hz , <br> Amplitude: 0.375 mm half amplitude ( 0.75 mm double amplitude) |  |  |  |
| Mechanical shock resistance |  |  | $300 \mathrm{~m} / \mathrm{s}^{2}$ (destruction), $100 \mathrm{~m} / \mathrm{s}^{2}$ (malfunction) |  |  |  |
| Ambient temperature |  |  | -10 to $+55^{\circ} \mathrm{C}$ (No freezing or condensation) |  |  |  |
|  |  |  | 25 to $85 \%$ RH |  |  |  |
| Pollution de |  |  | 2 |  |  |  |
| Terminal tightening torque |  |  | 0.5 Nm (Applicable only to TYPE G9SX-NS $\square$-RT: screw terminal mod |  |  |  |
| Weight |  |  | Approx. 200g |  |  | Approx. 125 g |
| Isolation specifications |  |  |  |  |  |  |
| Item |  |  |  | TYPE | G9SX-NS | A222-T03-प/G9SX-NS202 |
| Insulation resistance | - Between Logical AND connection 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 connection terminals, and Power supply input terminals and other input and output terminals connected together. |  |  |  |  | 500 VAC for 1 min |
|  | - Between all termin | s connected together and DIN rail |  |  |  | 500 VAC for 1 min |

Note:
(1) Power consumption of loads and non-contact door switches is not included.
(2) Ensure that thi (2) Ensure that the cur

Note:
(10) The number of TYPE G9SX-EX401- - (Expansion Unit) and TYPE
G9SX-EX041-T- $\square$ (Expansion Unit, Off-delayed model) not included. 3) While safety outputs are at its ON state, signal sequence show 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
G9SX-NA222-T3-प/G9SX-NS202- $\square: 0.4 \mathrm{~A} \mathrm{max}$. Ioad curren ) The following derating is required when inductive load is connected to safety outputs.

- IEC/EN60947-5-1 DC-13: 0.8 A - UL508 Pilot Duty: $\quad{ }_{0} .5 \mathrm{~A}$ 6) When multiple units are connected by logical connection, the total operating/response time is an accum
operating/resposse time connected. (7) Required time for safety connected.
necessary inputs turn ON. necessary inputs turn ON.
Switch input and 24 VDC is 35 ms Max
Switch input and 24 VDC is 35 ms Max.
For other applications, different to door switches, it shall be necessary to calculate the safety distance with the fault detection time 35 ms max.


Preset Switches
Change the value of the preset s.
disconnected riom power supply
The states of the preset suith


sure to set the preses switch to AND (vaiald) position for the enits whit
logical input signal is input to. When the swith is set to OFF (invalid)
position, it is detected as a a autl.




OFF-DELAY cutting edge OFF-DELAY

## 3 Dimensions

Type G9SX-NSA222-T03-


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


1 Internal power supply circuit is not isolated.
22 Logical AND inputi is isolated. Type G9SX-NS202- $\square$

 ON-state residual voltage | Maximum cable length for Logical connection input, Safety inputs |
| :--- |
| and Non-contact Door Switch input | Total number of units connected with Logical connection



Mechanical shock resistanc

| Ambient humidity |
| :--- |
| Pollution degree |
| Terminal tighteni |

Isolation specifications

Suitability for Use Omron Companies shall not be responsible for conformity with any standard
codes or repulations which apply to the combination of the Product in the
Buyer's application or use of the Product At
 limititions of use which apply to the Product. This intormation by itself is
sufficient for a complete determination of the suitability of the Product in
combination with the end product, machine, system, or other application use. Buyer shall be solely responsible for determining appropriateness of the
particiular rroduct wwit respect to Buyer's applicition, product or system.
Buyer shal take application responsibity ip all NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVIIG SERIOUS
RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITES WITHOUT ENSUILIG THAT THE SYTEM A A A AHGLLE HAS BEN DESIGNED TO
ADDRESS THE RISKS, AND THAT THE OMROA PRODUCT(S) IS PROPER RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL
EQUIPMENT OR SYSTEM.

OMRON Corporation (Manufacturer)
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- OMRON (CHINA) CO., LTD.
- Room 22111, Bank of China. Towe
200 Yin



## 5 Examples of application <br> <br> Application and timing chart

 <br> <br> Application and timing chart}
## G9SX-NSA222-T03 (24VDC)



G9SX-NSA222-T03 (24VDC)
[ (2-channel safety limit switch input + non-contact door switch input / Auto reset)


| Signal Name | Terminal Name | Description of operation |
| :---: | :---: | :---: |
| Power supply input | $\begin{aligned} & \mathrm{A} 1, \\ & \mathrm{~A} 2 \end{aligned}$ | Connect the power source to the A1 and A2 terminals. |
| Safety input 1 | $\begin{array}{\|l\|} \hline \text { T11, } \\ \text { T12 } \end{array}$ | 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. |
| Safety input 2 | $\begin{aligned} & \mathrm{T} 21, \\ & \mathrm{~T} 22 \end{aligned}$ |  |
| Feedback/ Reset input | $\begin{aligned} & \hline \text { T31, } \\ & \text { T32, } \\ & \text { T33 } \end{aligned}$ | 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. |
| Logical AND connection input | $\begin{array}{\|l\|} \hline \text { T41, } \\ \text { T42 } \end{array}$ | Logical AND connection means that lower unit (Unit B) calculates the logical multiplication (AND) of the safety output information from upper unit (Unit A ) and safety input signal " b ", which is input to lower unit. In the example of a right picture, the safety output of Unit C is "a" AND "b". |
|  |  | Connect L1 or L2 of upper unit to $T 41$ of lower unit, and connect GND of upper unit to T42 of lower unit. |
|  |  | To set Safety solid-state outputs of the subsequent Unit in ON state, its Logical AND Connection Preset Switch must be set to AND (enable) and High state signal must be input to T41 of the subsequent unit. |
| Cross fault detection input | Y1 | Selects a mode of failure detecting (Cross fault detecting) function for safety inputs of G9SX-NSA222-T03- $\square$ corresponding to the connection of Cross fault detection input. |
| Safety solid-state output | $\begin{aligned} & \hline \begin{array}{l} \text { S14, } \\ \text { S24 } \end{array} \end{aligned}$ | 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. |
| Off-delayed Safety solid-state output | $\begin{array}{\|l\|l} \mathrm{S} 44, \\ \mathrm{~S} 54 \end{array}$ | 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. |
| Logical connection output | L1 | Outputs a signal of the same logic as Safety solid-state outputs. |
| Non-contact Door Switch input | $\begin{aligned} & \mathrm{D} 1, \\ & \mathrm{D} 2, \\ & \mathrm{D} 3, \\ & \mathrm{D} 3, \\ & \mathrm{D4} \end{aligned}$ | To set Safety solid-state outputs in ON state, all non-contact door switch must be ON state. Otherwise Safety solid-state outputs cannot be in ON state. |
| Auxiliary Monitor output | X1 | Outputs a signal of the same logic as Safety solid-state outputs |
| Auxiliary Error output | X2 | Outputs during error indicator is lighting up or blinking. |

For connecting multiple non-contact doort swith to G9SX-NSロ,

6 Performance Level and Safety Category of ISO 13849-1
The G9SX-NS $\square$ together with D40A can be used up to PL=d and Category 3, and
the G9SX-NS together with D40Z can be used for PL=e and Category 4, required by EN ISO $13849-1$ European standard.
efer to the following link for the Satety-related characteristic data:
htp://www.fa.omron.co.jp/satety $6 e n /$
This does NOT mean that G9SX-NS $\square$ can a
under all the similar conditions and situations.

Conformity to the categol for must be assessed as a whole system.
When using G9SX-NS $\square$ for safety categories, make sure the conformity of the
whole system.
1)Conect D40A/D40Z inputs and outputs with terminals D1, D2, D3 and D4.
IInput the signals to both of the Safety inputs (T11-T12 and T21-T22)
3) Input a signal to the Safety inputs (T11-T12 and T21-T22) through switches with Direct Opening mechanism
4) 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).(Reter to ' 5 Examples of Application')
5) Be sure to Connect A 2 to ground

7 Fault Detection

| $\begin{array}{\|c} \hline \text { ERR } \\ \text { indicator } \end{array}$ | 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-NS $\square$ and its related system. 2) Replace with a new product. |
|  | $\begin{gathered} \text { Ti Blink } \\ \hline \end{gathered}$ | Faults involved with Safety input 1 | 1) Failures involving the wiring of Safety input 1 <br> 3) Failures of the parts of the circuits of Safety input 1 , | 1) Check the wiring to T11 and T12. (See Note1 ,2) <br> 2) Check the wiring to Y1. (See Note1) <br> 3) Replace with a new product. |
| Light up | $\begin{gathered} \text { T2 Blink } \\ \hline \end{gathered}$ | Faults involved with Safety input 2 | 1) Failures involving the wiring of Safety input 2 <br> 2) Incorrect setting of Cross fault detection mode. <br> 3) Failures of the parts of the circuits of Safety input 2 . | 1) Check the wiring to T21 and T22. (See Note1 ,2) <br> 2) Check the wiring to Y1. (See Note1) <br> 3) Replace with a new product. |
|  | FB Bink | Faults involved with Feedback/Reset input | 1) Failures involving the wiring of Feedback/Reset input. 2) Failures of the 2) Failures of the parts of the circuits of Feedback/Reset input | 1) Check the wiring to $\mathrm{T} 31, \mathrm{~T} 32$, and T 33 (See Note 1,2) <br> 2) Replace with a new product. |
|  |  | Faults of Expansion units | 1) Improper feedback signals from Expansion units <br> 2) Abnormal supply voltage to Expansion units <br> 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. <br> 2) Check the supply voltage to Expansion units. <br> Make sure that all Expansion units' PWR <br> indicators are lighting. <br> 3) Replace the Expansion unit with a new one. |
|  |  | Faults involved with Safety solid-state outputs or Logical connection outputs | 1) Failures involving the wiring of Safety solid-state outputs <br> 2) Failures of the parts of the circuits of Safety solid-state outputs <br> 3) Failures involving the wiring of Logical connection output <br> 4) Failures of the parts of the circuits of Logical connection <br> output <br> 5) Impermissible high ambient temperature | 1) Check the wiring to S14 and S24 (See Note1) <br> 2) Replace with a new product. <br> 3) Check the wiring to L1. (See Note1 ,2) <br> 4) Replace with a new product. <br> 5) Check the ambient temperature and spacing around G9SX-NS. |
|  | ED Blink | Faults involved with Off-delayed Safety solid-state outputs solid-state outputs | 1) Failures involving the wiring of Off-delayed <br> Safety relay contact outputs <br> 2) Incorrect set values of Off-delay time <br> 3) Failures of the parts of the circuits of Off-delayed <br> Safety relay contact outputs <br> 4) Impermissible high ambient temperature | 1) Check the wiring to $S 44$ and S 54 (See Note 1) <br> 2) Confirm the set values of the two of <br> Of-delay time preset switches. (See Note3) <br> 3) Replace with a new product. <br> 4) Check the ambient temperature and spacing around G9SX-NSA222-T03-ם. |
|  | $\begin{gathered} \text { AND Blink } \\ \text { An } \end{gathered}$ | Faults involved with Logic AND connection input | 1) Failures involving the wiring of Logic AND connection input <br> 2) Incorrect setting for Logic AND connection input <br> 3) Failures of the parts of the circuits of Logical AND connection input | 1) Check the wiring to T41 and T42 (See Note1, 2, 4) <br> 2) Confirm the set value of the Logical AND <br> connection preset switch <br> 3) Replace with a new product. |
|  | $\begin{gathered} \text { NS Blink } \end{gathered}$ | Faults involved with Non-contact Door Switch input | 1) Failures involving the wiring of Non-contact Door Switch input <br> 2) Failures involving the wiring of multipul Non-contact Door <br> Switches <br> 3) Failures of the parts of the circuits of G9SX-NS $\square$ <br> 4) Failures of the parts of the circuits of D40A/D40Z |  |
|  |  | Supply voltage outside the rated value | ${ }^{1)}$ Supply voltage outside the rated value | ${ }^{1)}$ Check the supply voltage to Expansion units. |

Note: (1) Check miswiring, short, or open, etc. (See 'Wiring of inputs and outputs')
(2) Make sure that the wiring length is 100 meters or less. (See 'Precautions for Correct Use(8)')
(3) See 'Preset Switches'.
(4) See '4 Ratings and Specifications' Note 9

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

| ERR <br> indicator | The other indicators | Conditions | Expected causes of the faults | Expected causes of the fauls |
| :---: | :---: | :---: | :---: | :---: |
| $\underset{\text { Light off }}{\bigcirc}$ | $\begin{aligned} & \text { T1 Bling or/ } \\ & \text { Tnd T2 Blink } \end{aligned}$ | 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-NS $\square$ Or check the inputs sequence of safety input devices. After removing the fault, turn both safety inputs to OFF state. |

