

# Safety Modules

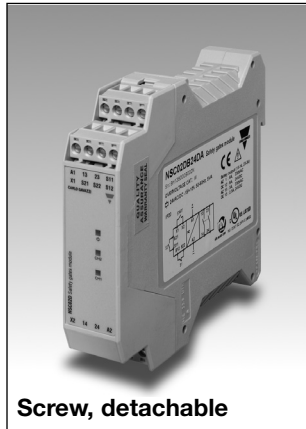
## Safety Gate and Safety Magnetic Sensor

### Types NSC02D, NSC13D

CARLO GAVAZZI



Screw, fixed



Screw, detachable

- Safety Category 4, Performance Level e, according to EN 13849-1
- Safety Category 4 according to EN 954-1
- Category 0 Emergency Stop (EN 60204-1)
- Input type: 1 NO + 1 NC
- 2 x 6 A NO safety outputs (NSC02D)
- 3 x 6 A NO safety outputs and 1 x 6 A NC auxiliary output (NSC13D)
- Automatic / manual or monitored manual reset
- Single / double channel operations
- LED indication for outputs status and power supply ON
- Connection by fixed or detachable terminals
- For mounting on DIN-rail in accordance with DIN/EN 50 022
- 22.5 mm Euronorm housing

## Product Description

Safety gate and safety magnetic sensor modules according to EN 60204-1, EN 292-1/-2, EN 418 and EN1088. This family of safety module in Safety Category 4,

Performance Level e, includes fixed screw and detachable screw as well as automatic / manual or monitored manual restart versions.

## Ordering Key

**N SC 0 2 D B24 S A**

Housing	_____
Function	_____
Auxiliary outputs	_____
Safety outputs	_____
Safety category	_____
Power supply	_____
Terminals	_____
Start/Reset type	_____

## Type Selection

Auxiliary outputs	Safety outputs	Terminals	Start/Reset type	Supply: 24 VAC/DC
	2 NO	Screw, fixed	Automatic / Manual	<b>N SC 0 2 D B24 S A</b>
	2 NO	Screw, fixed	Monitored manual	<b>N SC 0 2 D B24 S C</b>
	2 NO	Screw, detachable	Automatic / Manual	<b>N SC 0 2 D B24 D A</b>
	2 NO	Screw, detachable	Monitored manual	<b>N SC 0 2 D B24 D C</b>
1 NC	3 NO	Screw, fixed	Automatic / Manual	<b>N SC 1 3 D B24 S A</b>
1 NC	3 NO	Screw, fixed	Monitored manual	<b>N SC 1 3 D B24 S C</b>
1 NC	3 NO	Screw, detachable	Automatic / Manual	<b>N SC 1 3 D B24 D A</b>
1 NC	3 NO	Screw, detachable	Monitored manual	<b>N SC 1 3 D B24 D C</b>

## Time Specification

Delay ON energisation	< 150 ms
Delay ON de-energisation	< 30 ms
Recovery time	≥ 30 ms
Channel simultaneity during outputs closing	Infinite
Input operating to START operating delay NSC...C	> 500 ms

## Input Specification

Function	1 NO + 1NC, voltage free
Input current	
NSC02D	
Terminals S12-S22	max. 35 mA
Terminals S11-S21	max. 10 mA
NSC13D	
Terminals S11-S12	max. 35 mA
Terminals S21-S22	max. 10 mA
Input resistance	
NSC02D	
Terminals S12-S22	max. 3.3 kΩ
NSC13D	
Terminals S11-S12	max. 3.3 kΩ
External contact resistance	
NSC02D	
Terminals S12-S22	max. 60Ω
Terminals S11-S21	max. 60Ω
NSC13D	
Terminals S11-S12	max. 60Ω
Terminals S21-S22	max. 60Ω

## Output Specification

<b>Safety outputs</b>	Category 4, Performance Level e (EN 13849-1)
NSC02D	2 NO (13-14, 23-24)
NSC13D	3 NO (13-14, 23-24, 33-34)
<b>Auxiliary output</b>	
NSC13D	1 NC (41-42)
<b>Rated insulation voltage</b>	250 VAC (rms)
<b>Contact ratings</b> (AgSnO <sub>2</sub> )	2 µm Au
Safety outputs	
Resistive loads	6 A @ 230 VAC
	6 A @ 24 VDC
Small inductive loads	3 A @ 230 VAC
	2.5 A @ 24 VDC
Auxiliary output	6A, 24 VAC/DC
<b>External contact fuse protection</b>	5 A fast, 4 A slow
<b>Mechanical life</b>	> 10 <sup>7</sup> operations
<b>Electrical life</b>	> 10 <sup>5</sup> operations
<b>Dielectric strength</b>	
Dielectric voltage	4 kVAC (rms)

## Supply Specifications

<b>Power supply</b>	Rated operational voltage through terminal: A1, A2	Overvoltage cat III (IEC 60664)
		24VAC - 15% / 10%, 50 to 60 Hz
		24 VDC - 15% / +10%
<b>Short circuit protection</b>	Internal PTC	
<b>Dielectric voltage</b>	Supply to input	<b>DC supply</b> none
	Supply to output	<b>AC supply</b> none
	Input to output	4 kV 4kV
<b>Rated operational voltage</b>	max 5 VA	

## General Specification

<b>Indication for</b>		<b>Weight</b>	Approx. 200 g
Power supply ON	LED, green	<b>Screw terminals</b>	
Output relays ON	LED, green (CH 1, CH2)	Tightening torque	
<b>Environment</b>	(EN 60529)		Upper terminals
Degree of protection	IP 20	Max. 0.5 Nm	
Pollution degree	2	Lower terminals	Max 0.8 Nm
Operating temperature	-25 to 65°C, R.H. < 95%	<b>Approvals</b>	cULus, TUV
Storage temperature	-30 to 65°C, R.H. < 95%	<b>CE Marking</b>	Yes
<b>Minimum protection degree of the installation location</b>	IP 54	<b>EMC</b>	Electromagnetic Compatibility
<b>Housing dimensions</b>	22.5 x 99 x 114 mm	Immunity	According to EN 61000-6-2
		Emission	According to EN 61000-6-3

## Mode of Operation

The safety modules NSC02D and NSC13D monitor both mechanical switches and safety magnetic sensors (1 NO + 1 NC contact outputs), according to 98/37/CE Machinery Directive.

If the unit is correctly supplied and the input terminals are operated (S1 closed and S2 open, i.e. safety gate closed), the module is enabled to close the safety outputs and the external contactors can be energized. When the input terminals are released (S1 open and S2 closed, i.e. safety gate open) the module is not enabled to close the safety outputs and the external contactors can not be energized.

### Automatic START

Provided that the terminals X1 and X2 (NSC02...A) or S33 and S34 (NSC13...A) are connected, the safety outputs close and the auxiliary output opens (NSC13...A) as soon as both S1 and S2 switches operate. The relevant CH1 and CH2 LED turn on. Releasing even one input contact (S1 and/or S2) forces immediately the safety outputs to open and the auxiliary output (NSC13...A) to close.

A new operating cycle is possible only after releasing both input contacts and then operating them again.

### Manual START

Provided that S1 switch is

closed and S2 is open, the safety outputs close and the auxiliary output opens (NSC13...A) as soon as the NO START pushbutton is pushed [connecting X1 and X2 (NSC02...A) or S33 and S34 (NSC13...A)]

A new operating cycle is possible only after releasing both input contacts, closing them again and pushing the START button.

### Monitored manual START

The monitored manual START versions (NSC...C) work as described in the previous paragraph (Manual START) except for a minimum delay of 500 ms from the operated status of the input contacts (S1 closed, S2 open) to the

pushing of the START button. If the input terminals get operated with the START switch already closed, the safety outputs don't close and the auxiliary doesn't open (NSC13...C): it is necessary to release the START button and the input contacts before starting a new cycle, then operate the input contacts and finally, after at least 500 ms, operate the START button.

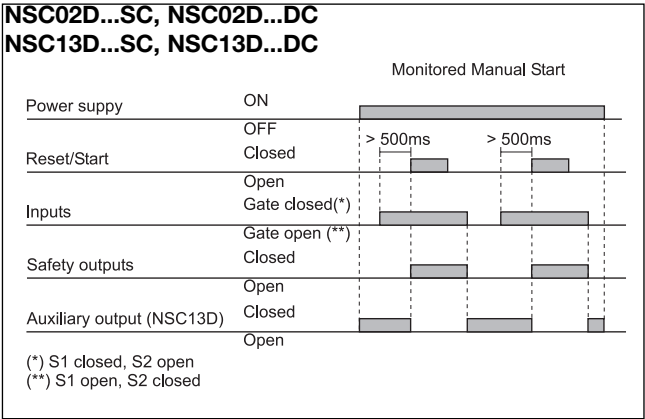
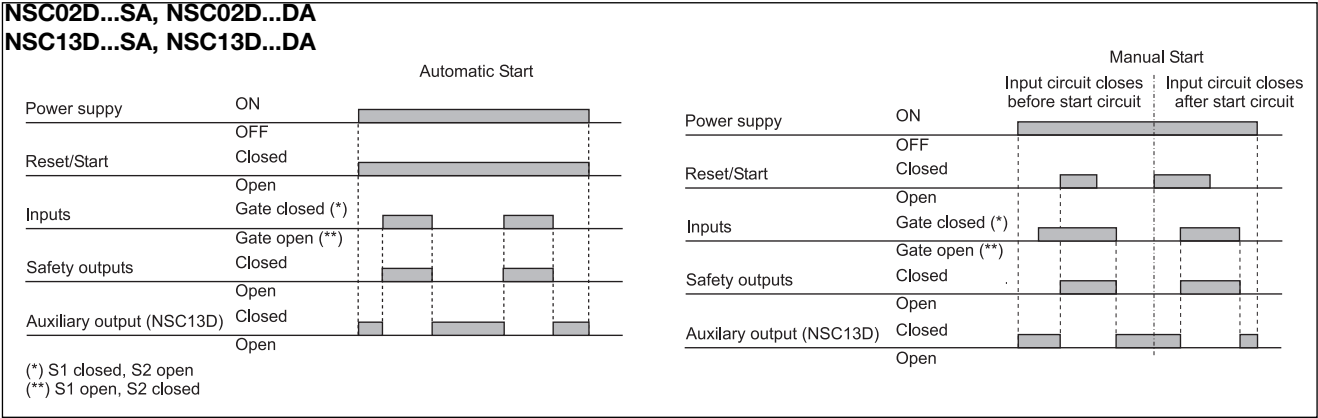
So if the NO START button gets welded, the outputs don't close anymore.

### Note.

NSC02D and NSC13D can be also used as Emergency Stop modules, ensuring up to Safety Category 3.

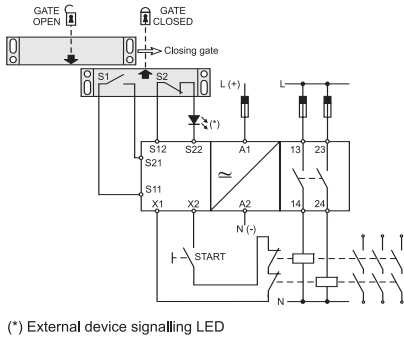


Operational Diagram

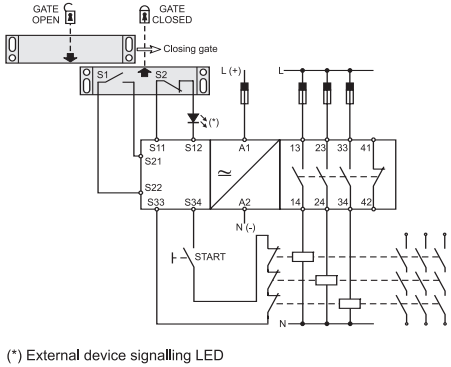


Wiring Diagrams

NSC02D - Magnetic sensor and one access monitoring (Double channel)

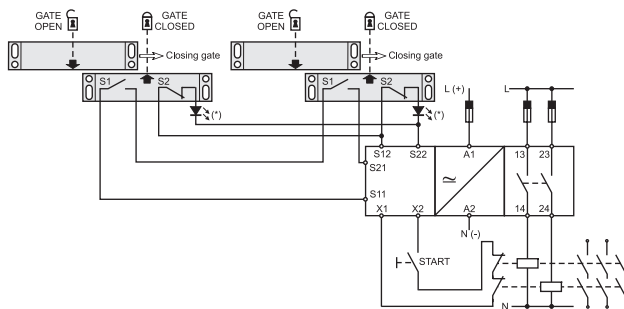


NSC13D - Magnetic sensors and one access monitoring (Double channel)



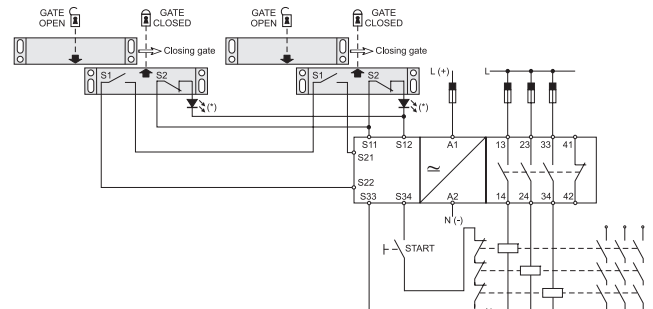
## Wiring Diagrams (cont.)

**NSC02D - Magnetic sensors and two accesses monitoring (Double channel)**



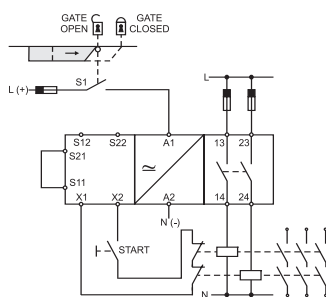
(\*) External device signalling LED

**NSC13D - Magnetic sensors and two accesses monitoring (Double channel)**

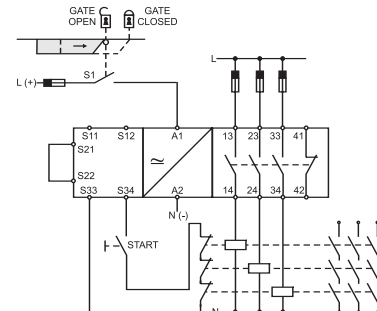


(\*) External device signalling LED

**NSC02D - Mechanical switch and one access monitoring (Single channel)**

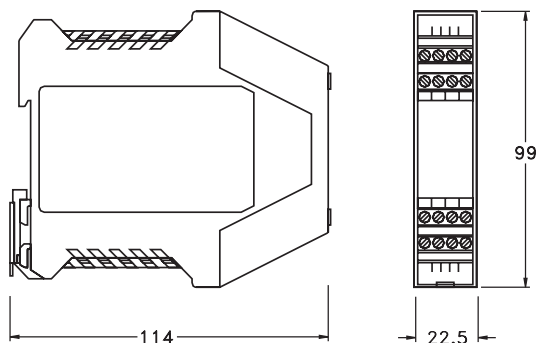


**NSC13D - Mechanical switch and one access monitoring (Single channel)**

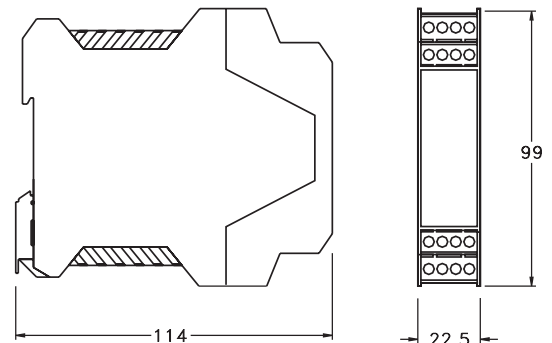


## Dimensions

**Versions with fixed terminals**



**Versions with detachable terminals**



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