

These operating instructions are only valid in conjunction with the operating instructions for the relevant sensors and magnet.

Correct Use

The coded Magnetic Safety switches are a series of technical safety devices for monitoring moveable separating safety guards. They ensure that dangerous work on machines can only be carried out if the safety guards are closed.

A stop command is triggered if a safety guard is opened while the machine is running. Before safety switches are used, a risk assessment must be performed on the machine in accordance with:

EN ISO 13849-1:2015, Safety of machinery Safety-related parts of control systems: Part 1: General principles for design;

EN ISO 14119:2013, interlocking devices associated with guards;

EN 60204-1:2018, electrical equipment of machines;

EN 60947-5-3:2013, Low-voltage switchgear and controlgear. Part 5-3: Control circuit devices and switching elements - Requirements for proximity devices with defined behaviour under fault conditions (PDDDB)

A max. of 2 sensors may be connected to the control unit.

Assembly

Installation must be performed by authorized personnel only.

The NC11 01 control unit must be assembled in a suitable operating area (switch cabinet, protective housing, at least IP 54).

The control unit is installed by clipping it to a standard 35 mm top-hat rail in accordance with EN 50022.

Electrical Connection

Electrical connection must be performed by authorized personnel only.

All the electrical inputs must either be isolated from the mains supply by a movable safety transformer in accordance with

EN IEC 61558-2-6 with limited output voltage in the event of a defect or by another equivalent movable mechanism. The supply have to be connected in a permanently way and using a cable with a maximum length of 10 m; the sensors have to be connected to the unit using a cable with a maximum length of 30 m.

Terminals A1 and A2 are reverse polarity protected for connection of the power supply for all outputs (safety and door signal output).

External contact fuses (4 A quick-action fuse) for relay outputs must be fitted.

All the output contacts must have an adequate protective circuit for capacitive and inductive loads. If a standard power supply is used, all the inductive and capacitive loads (e.g. relay contactors) connected to the power supply must be connected to appropriate interference suppressors.

If sensors are not connected to the plug-in terminals provided in the control units, the bridges supplied must be installed in accordance with the connection plan.

Service and Inspection

For category 1 No servicing is required. In order to ensure lasting, trouble-free operation, **regular inspection** of the following is required:

- correct switching function
- secure mounting of components
- loose connections.

For category 2 is necessary a **regular inspection** of the system that control the correct switching function **once a shift** or not later than every **8 hours**. This test has to be performed by opening every single safety door.

In case of a door open condition:

- The safety output **MUST BE OFF**
- The led on the control unit related of the sensor on the door **MUST BE OFF**.

In the event of damage or wear and tear, the damaged system component must be replaced. If the protective doors are not frequently used, the system should be subjected to a function test as part of the inspection schedule.

Liability coverage is void under the following circumstances:

- if instructions are not followed
- non-compliance with safety regulations
- installation and electrical connection not performed by authorized personnel
- non-implementation of functional checks.

Setup

If the control unit does not appear to function when operating voltage is applied (green PWR LED does not light up), the unit must be returned unopened to the manufacturer.

Check whether the safety outputs are being switched (see LED display) by opening and closing the protective door.

LED displays

Function	LED	Colour	State
Operating voltage	PWR	green	on
Sensor 1	Magnet in activation area	S1	green
	Magnet not in activation area	S1	green
Sensor 2	Magnet in activation area	S2	green
	Magnet not in activation area	S2	green

If the magnets are in the response area (or one sensor and one 4-pole jumper) safety output 13/14 is switched through. LEDs S1 and S2 light up. If the 4-pole jumper is used, the relevant LED S1 and / or S2 lights up and stays on.

SAFETY PRECAUTIONS

The safety switch fulfills a personal protection function. Incorrect installation or manipulation can lead to severe injuries to personnel.

Safety switches must **not** be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.

The switching operation may only be triggered by coded magnets specially provided for this purpose which are permanently connected to the safety guard.

A complete safety-oriented system generally consists of several signalling devices, sensors, control units and concepts for safe shut-off operations. The manufacturer of a machine or installation is responsible for correct and safe overall function.

Functioning

The safety system consists of a control unit, sensors and activation magnets and is only functional in particular combinations (see combination options)!

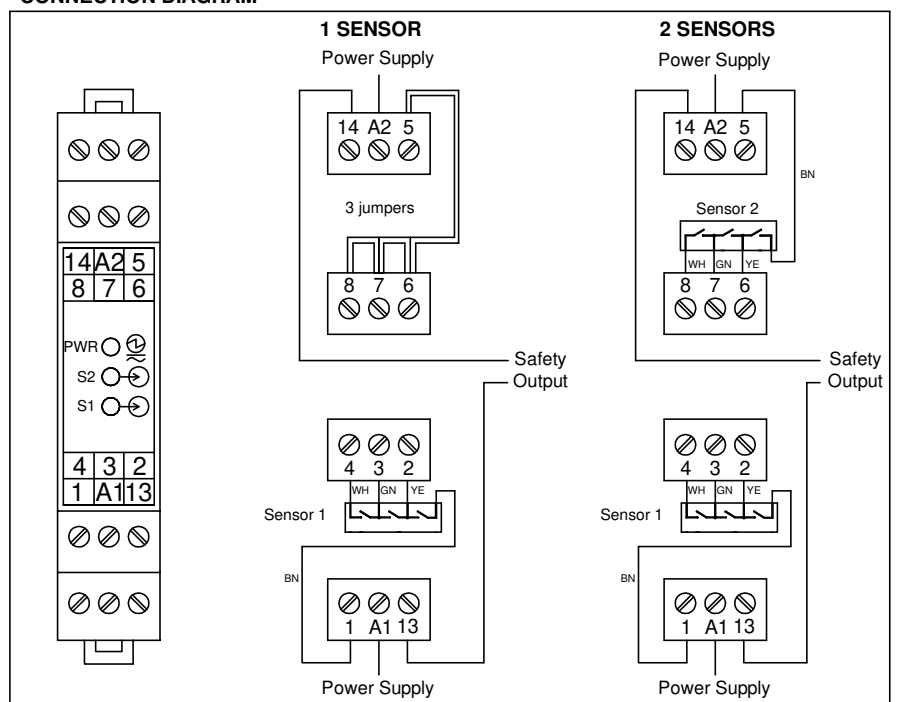
The sensors connected to the control unit contains reed contacts which are activated by the coded magnets. The safety control unit converts this information and transfers the safety guard state to the control system via a safety output.

When the protective door is being opened or closed, the control unit is checked to ensure that it is functional. In this way internal errors from the sensors to the control unit output can be detected.

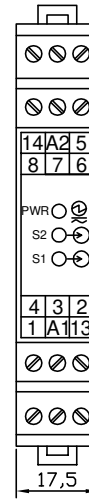
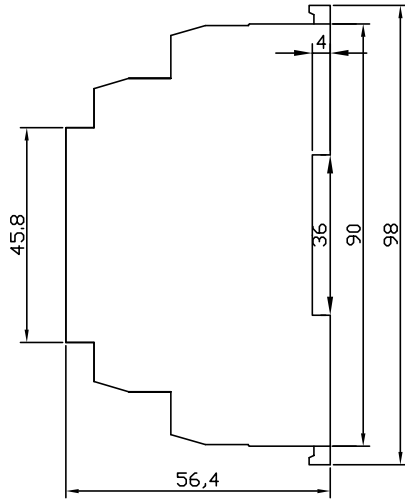
If an error is detected, the control unit goes into a blocked state. The safety outputs remain in the open state.

The control unit status is displayed visually by means of LED displays.

CONNECTION DIAGRAM



NC11 01 Overall Dimensions



NC11 01 Combination Options Table

Shape	Sensor	Safety Category	Circuit Diagram	Activation Magnet	Activation Distance Son [mm]*	Deactivation Distance Soff [mm]*	Reset Distance [mm]*
	N510 FC N510 LC	1		M140	< 6	> 14	-
	N510 FD N510 LD			M148	< 18	> 30	-
	N520 FE N520 LE			M125	< 6	> 14	-
M18	N180 FB			M110 M11A	< 7	> 13	-
M25	N250 FB N250 LB			M110 M11A	< 7	> 13	-
M30	N300 FB N300 LB			M113	< 7	> 13	-
	N55x FE	M15x	> 2*** < 6	> 18	-		

* Activation, deactivation and reset distances are influenced by ferromagnetic materials. all the data applies to the frontal direction of approach and a center offset of 0,0 mm.

***Sensor activation is guaranteed between this two distances.

All the distances have a tolerance of ±1 mm.

UL Certification Requirements

Power Source (input)			
Input Terminals	Voltage	Max. Current	
A1-A2	24Vac/dc	45mA	
Auxiliary Outputs (SAFETY)			
Output Terminals	Contacts Type	General Use Or Resistive	Pilot Duty
13-14	NO	4A/250Vac 4A/24Vac	1A/240Vac 1A/24Vac
Environmental Ratings		Installation Notes	
Max. Surrounding Air Temperature: 50°C Pollution Degree: 2		Use with min. 60°C copper (CU) conductor only Terminal tightening torque: 4.5 lbin (0,51 Nm)	
Environmental designation			
Open type equipment			

Technical Data

Parameter	Value	Units	
Housing Material	Poliammide PA66		
Dimensions	98 x 56,4 x 17,5	mm	
Mass	115	g	
Ambient temperature	0 ... +55	°C	
Storage temperature	-25 ... +70	°C	
Degree of protection (IEC 60529)	Terminals: IP20 / Housing: IP40		
Degree of contamination	2		
Assembly	35 mm standard top-hat rail (EN50022)		
Max number of sensors	2		
Connection type	Screw terminals		
Supply Voltage	24 ±10%	V AC/DC	
Internal fuse on the supply	750 mA PTC		
Switching voltage to the output (max)	250	V AC	
Typ. current consumption	45	mA	
Switching current (Imax @ 24 V)	4	A	
Switching current (Imin @ 12 V)	4	mA	
Switching power to the output (max)	1000	VA	
External fuse on the output	4 A gG (acc. to IEC EN 60269-1)		
Safety outputs	1		
Usage category (safety output)	AC-1: 4A, 250V / AC-15: 1A, 250V AC-1: 4A, 24V / AC-15: 1A, 24V DC-13: 4A, 24V		
Safety category and PL EN ISO 13849-1:2015	1 / 2** PL c		
nop (n. of operation / years)	34000	13200	N. cycles/years
MTTFd (AC-1: I laod = 4A)	39	100	years
PFHd	2,93x10 ⁻⁶	1,14x10 ⁻⁶	
B10d	AC-1 (4A) = 4x10 ⁵ ; AC-15 (1A) = 1,4x10 ⁶		N. cycles
TM	20		years
Output open response time	20		ms
Rated insulation voltage	250		V
Mechanical switching cycle relays	10 ⁷		N. cycles
Vibration and shock resistance	EN 60947-5-1:2017, EN 60947-5-3:2013		
EMC compliance	EN 60947-5-1:2017, EN 60947-5-3:2013 IEC 61326-3-1:2017		
In accordance with	EN 60204-1:2018, IEC 60664-1/Corr.1:2020, EN ISO 13849-1:2015, EN ISO 13849-2:2012, EN ISO 14119:2013		
Sensors class. (EN ISO 14119:2013)	Type 4		
Approval	TÜV IT 0948 10 MAC 0008		

** Safety category 2 (EN ISO 13849-1:2015) only with **regular inspection** of the system that control the correct switching function **once a shift** or not later than every **8 hours**.
This test has to be performed by opening every single safety door. In case of a door open condition:
- The safety output **MUST BE OFF**
- The led on the control unit related of the sensor on the door **MUST BE OFF**.