

Description

The NC96 MAT safety relay has been designed to control pressure sensitive safety mats and edges in according to EN ISO 13856-1:2013, EN ISO 13856-2:2013, EN 60204-1:2006+A1:2009, EN ISO 13849-1:2015. This module is based upon the use of guided-contact safety relays.

Safety Precautions

The pressure sensitive safety mats and edges fulfill a personal protection function.
Incorrect installation or manipulation can lead to severe injuries to personnel. The pressure sensitive safety mats and edges must not be bypassed (bridging the contacts), moved, removed or otherwise made ineffective. The manufacturer or the technician that intall the machinery is responsible for correct and safe overall function.
Auxiliary output 31/32 is optically isolated and gives informations about the state of the device; it must not be used as a safety output.
The NC96 MAT is not proper for the operation in presence of ionizing and not ionizing radiations (rays X, microwaves, laser, ultraviolet rays) (EN 60204-1:2006, §4.4.7).

Functioning

The NC96 MAT module is used to control pressure sensitive safety mats and edges: the safety outputs are closed only if the 2 inputs are closed and nobody is on the safety mat (edge) area. At the pressure of the safety device, the unit opens the safety outputs 13-14 and 23-24.
The reset (automatic) is possible if the mat (edge) is not pressed according to EN ISO 13856-1:2013 (Annex A) and EN ISO 13856-2:2013 (Annex A).
The NC96 MAT can be used only with automatic start (reset); to configure the system with manual and monitored start the NC95 module has to be used.

The opening of even only one input contact, leads to a safety situation, by putting the safety outputs in open state and by preventing the closing even after the re-closing of the contact and the pressure of the START button.

The system NC96 MAT + pressure sensitive safety mat or edge reaches the safety category 3 according to EN ISO 13849-1:2015 only if (see connection diagram):

- two relays are used to interrupt the load, each connected to an input of the safety unit;
- the contacts of the relays controlled by the safety unit are inserted into the feedback loop.

The safety is ensured by using guided contacts, by the redundance and by the interconnection schematic of the contacts.

The responsibility to choose the adequate components for safety applications, for example guided contacts safety relays, falls to the user.

Assembly

Installation must be performed by authorized personnel only.
The NC96 MAT control unit must be assembled in a suitable operating area (switch cabinet, protective housing, at least IP 54).
The unit is installed by clipping it to a standard 35 mm top-hat rail.

Electrical Connection

Electrical connection must be performed by authorized personnel only according to EN 60664-1:2006.
All the electrical inputs must either be isolated from the mains supply by a separate coils 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 power supply have to be connected in a permanently way and using a cable with a maximum lenght of 10 m; the safety mat has to be connected to the unit using a cable with a maximumum lenght of 30 m.
The outputs of the relays have a maximum current of 3 A; the power supply connected to the outputs must be protected from overcurrents by devices adequate to the loads that have to be protected. All the output contacts must have an adequate protective circuit for capacitive and inductive loads.
If a common 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.

Service and Inspection

The correct functioning of the NC96 MAT safety unit must be controlled by the operator and/or by the control circuit of the machine in which it is used periodically (at the beginning of every shift), by checking:

- correct switching function
- secure mounting of components
- correct connection fixing.

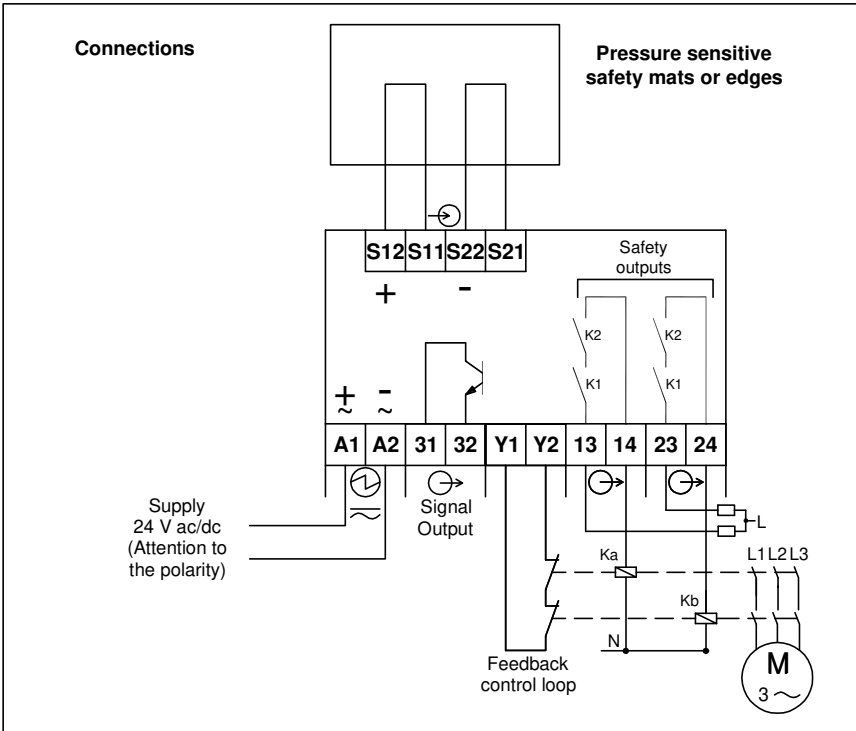
The monitoring function of the unit is done at every switching.
In the event of damage or wear and tear, the damaged system component must be replaced.

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

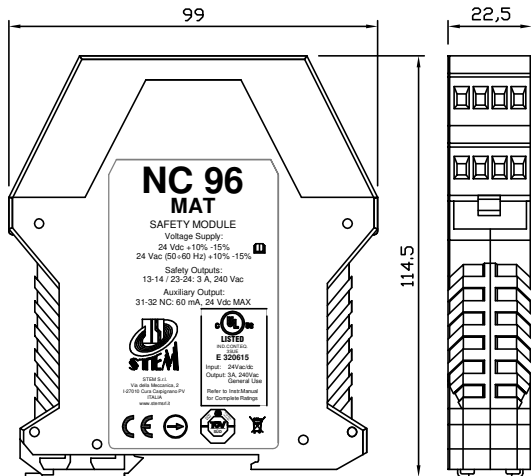
If the control unit does not appear to function when operating voltage is applied (green "Power" LED does not light up), the unit must be returned unopened to the manufacturer.
Check whether the safety outputs are being switched (see LED display) by activating the two inputs and START.



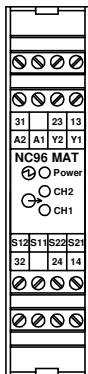
LED display

Function	LED	Color	State
Power supply	PWR	Green	on
Outputs 13-14 e 23-24 : OPEN	CH1	Green	off
Output 31-32 : CLOSED	CH2	Green	off
Outputs 13-14 e 23-24 : CLOSED	CH1	Green	on
Output 31-32 : OPEN	CH2	Green	on

NC96 MAT Dimensions



NC96 MAT Frontal view



Technical data

Parameter	Value			Unit
Housing material	PA			
Dimensions	114,5 x 99 x 22,5			mm
Weight	160			g
Operating conditions	Temperature: -5 ... +55			°C
	Relative humidity: 4% ... 100%			
	Pressure: 86 ... 106			kPa
Housing conditions	Temperature: -25 ... +70			°C
	Relative humidity: 5% ... 95%			
	Pressure: 86 ... 106			kPa
Degree of protection (IEC 60529)	IP20			
Degree of contamination	2			
Assembly	35 mm DIN standard rail			
Connection type	Screw terminals			
Supply voltage	24 -15% / +10% (AC 50 ÷ 60 Hz)			V ac/dc
Internal fuse on the supply	630 mA fast fuse			
Current consuption	@24Vdc: 25 min, 70 max; @24Vac: 110 min, 220 max			mA
Safety Outputs switching voltage	240 (max)			V AC
Switching current AC-1 / Electrical life	3 A (safety outputs) / >10 ⁵ cycles			
Minimum switching current @ 10 V	10			mA
Safety output switching power	720 (max)			VA
External fuse at the output	4 A gG (according to IEC EN 60269-1)			
Safety outputs terminals	13 -14, 23 - 24			
Auxiliary output terminals	31 - 32 NC (optoisolated)			
Usage category / Electrical Life (SAFETY outputs)	AC-15: 1,4 A / 240 V (inductive load, cosΦ=0,3) / 10 ⁵ c. DC-13: 1A / 24 V / 10 ⁵ cycles			
Auxiliary NC output parameters	max: 60 mA @ 24 Vdc			
Useful lifetime	10			years
OFF state response time	20			ms
Safety category and PL (EN ISO 13849-1:2015)	PL - d	Cat.3 PL - e	PL - e	
nop (n. operations / year)	66000	31900	19000	N.op / year
MTTFd	30	62	100	years
PFHd	2,65x10 ⁻⁷	8,84x10 ⁻⁸	4,29x10 ⁻⁸	
TM	20			years
Vibration resistance	EN ISO 13856-1:2013, EN ISO 13856-2:2013			
Mechanical life	10 ⁷			Cycles
EMC compliance	IEC 61326-3-1:2017 EN 55011:2011			
In accordance with	EN 60204-1:2006+A1:2009, EN ISO 13849-1:2015, EN ISO 13856-1:2013, EN ISO 13856-2:2013			
Approvals	TÜV IT 0948 10 MAC 0012			

UL CERTIFICATION REQUIREMENTS

Power Source (input)				
Input Terminals	Voltage		Max. Current	
A1-A2	24Vac/dc		220mA / 70mA	
Auxiliary Outputs (SAFETY)				
Output Terminals	Contacts Type	General Use Or Resistive	Pilot Duty	
13-14 23-24	NO	3A/240Vac Res	1.4A/240Vac	1A/24Vdc
Signaling Outputs (SIGNAL)				
Output Terminals	Contacts Type	Nom. Ratings		
31-32	NC	60mA/24Vdc		
Environmental Ratings Max. Surrounding Air Temperature: 55°C Pollution Degree: 2 Environmental designation Open type equipment		Installation Notes Use with min. 60°C copper (CU) conductor only Terminal tightening torque: 5-7 Lbln (0.56-0.79 Nm)		