Operating instructions for safety control unit mod. NCMAT02

- Translation of the original -

Description

The **NCMAT02** control unit is designed to monitor pressure-sensitive safety devices in accordance with EN ISO 13856-1, EN ISO 13856-2, EN 60204-1, EN ISO 13856-3, EN ISO 13849-1, EN ISO 13850.

⚠ Safety precautions ⚠

Pressure-sensitive safety devices perform a personal protection function. Improper installation or manipulation can cause serious injury.
Pressure-sensitive safety devices must not be bypassed (short-circuiting the contacts), moved, removed, or otherwise rendered ineffective.
The manufacturer or installer of the machine is responsible for correct and safe operation.
Auxiliary outputs 32 and 33 must not be used as safety outputs in any way.
ALL THE SYSTEM COMPONENTS MUST HAVE THE SAME VOLTAGE REFERENCE (0Vs).
The **NCMAT02** is not suitable for operation in the presence of ionizing or non-ionizing radiation (X-rays, microwaves, lasers, ultraviolet rays) (EN 60204-1:2006, §4.4.7).

Operation

The **NCMAT02** safety control unit can monitor the status of 4-wire and 2-wire pressure-sensitive safety devices with an integrated 8.2 KΩ resistor: the output is activated by pressing and releasing the reset button (Y0-Y1) only if the device is connected to the inputs and if no operator is within the area covered by the device. When the device is pressed, the control unit opens safety outputs 13-14 and 23-24. The OSSD outputs are semiconductor type protected against short circuit.

Manual and monitored resetting is only possible once the device is no longer pressed, as required by EN ISO 13856-1 (Appendix A), EN ISO 13856-2 (Appendix A), and EN ISO 13856-3 (Appendix A).

The control unit can be configured to automatically reset when the device is released by connecting terminals Y0-Y2.

Opening input X1-X2 creates a safety situation, placing the safety outputs in the open state and preventing them from closing even after the reset button is pressed.

The NCMAT02 system + pressure-sensitive device achieves safety category 3 according to EN ISO 13849-1 only if:
- a 4-wire device (separate channels) is used
- a 2-wire device with an integrated resistor approved for safety category 3 is used (otherwise the system is downgraded to safety category 1)
- two relays (Ka, Kb; see "Connections") are used to interrupt the load, each connected to an output of the control unit.

To verify the functionality of the Ka and Kb relays, the NC auxiliary contacts of these relays can be connected in series to the reset circuit.

An emergency stop button can be connected in series to the safety device (EN ISO 13850, stop category 0).

It is the user's responsibility to select suitable components for safety applications, such as forcibly guided contact relays.

Installation

Installation must be performed only by authorized personnel.
The NCMAT02 control unit must be installed in a suitable operating area (switchboard, junction box, at least IP54). The control unit is mounted on a standard 35 mm DIN rail.

Leds indications

FUNCTION	LED	Colour	Status
Operating voltage	POWER	Green	on
Output 14 and 24 : OPEN **Output 32 : CLOSED** **Output 33 : OPEN**	CH1	Green	off
	CH2	Green	off
Output 14 and 24 : CLOSED **Output 32 : OPEN** **Output 33 : CLOSED**	CH1	Green	on
	CH2	Green	on

Electrical Connections

Electrical connections must be made only by authorized personnel in accordance with EN 60204-1.
All electrical inputs must be isolated from the mains power supply or by a separate winding transformer in accordance with EN IEC 61558-2-6 with limited output voltage in the event of a fault, or by an equivalent removable mechanism.
The power supply must be permanently connected using a cable no longer than 10 m; the safety device must be connected to the unit with cables no longer than 30 m.
The safety outputs have a maximum current of 0.5 A; the power supply connected to these outputs must be protected against overcurrent by devices appropriate for the loads to be protected.
ALWAYS WIRE THE LOAD BETWEEN OUTPUT TERMINALS AND A2 (0Vs).
All output contacts must have an adequate protection circuit for inductive and capacitive loads.
All inductive and capacitive loads
(e.g., relay contacts) connected to the power supply must be connected to an appropriate interference suppressor.

Maintenance and Inspections

The correct operation of the **NCMAT02** control unit must be checked periodically by the operator and/or the control circuit of the machine on which it is used (at the beginning of each shift, at the latest within 8 hours). This check includes:
- Correct switching
- Secure mounting of components
- Properly secured connections.

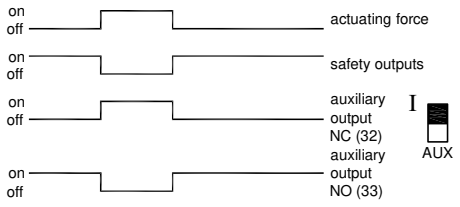
The device monitoring function is performed at each intervention of the device itself.
In case of failure or wear, the damaged system must be replaced.

Warranty coverage is voided in the following circumstances:
- Failure to follow the instructions
- Non-compliance with safety regulations
- Installation and electrical connection not performed by authorized personnel
- Failure to perform function checks.

Setup

If the control unit appears to be inoperative when power is applied (the green POWER LED does not light), the unit must be returned sealed to the manufacturer. Check whether the safety outputs switch (see LED table) by connecting a device and pressing the reset button.

Auxiliary output configuration in position "I" (instantaneous)

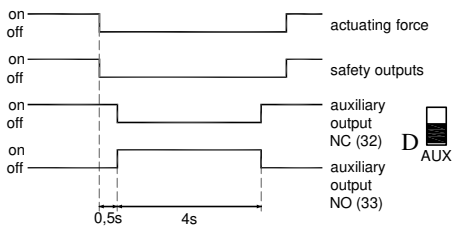


the timings of the auxiliary output 31-32, 31-33 are identical to those of the safety outputs 13-14, 23-24.

The "open" and "closed" status is the one shown in the figure.

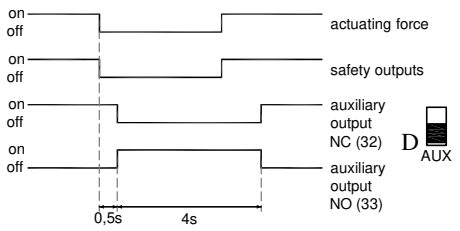
Auxiliary output configuration in "D" position (delayed)

NOTE: The state of the auxiliary output contacts is REVERSED compared to "Instantaneous" operation



Pulse X1-X2 > 4500ms

If the pulse X1-X2 has a duration greater than 4500ms, the auxiliary output changes state after 500ms from the falling edge of X1-X2 and returns to rest after 4500ms from that edge (even if the pulse X1-X2 lasts more than 4500ms).



Pulse X1-X2 [500..4500]ms

If the pulse X1-X2 is between 500ms and 4500ms the auxiliary output changes state after 500mS from the falling edge of X1-X2 and returns to rest after 4500ms from that edge.

NOTE:
If the pulse X1-X2 is less than 500ms the auxiliary output remains in its rest state and does not switch.

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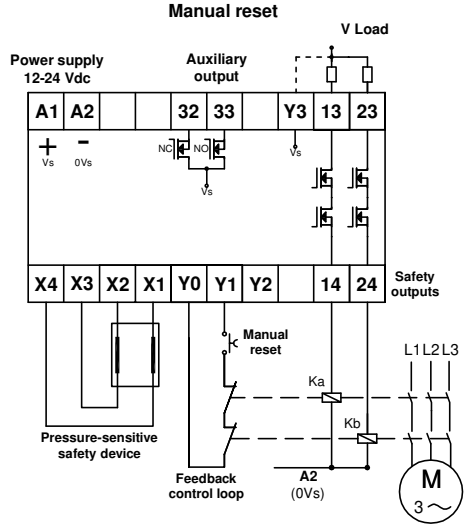
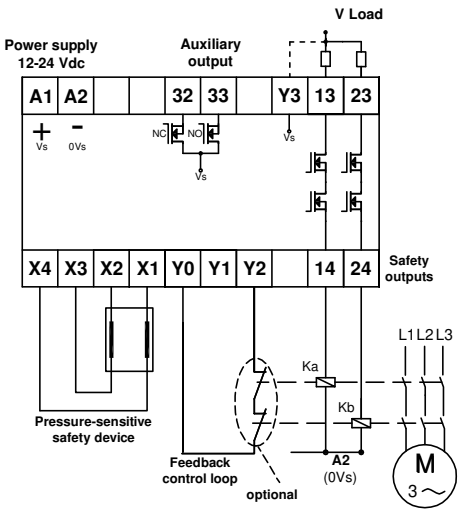
Connections

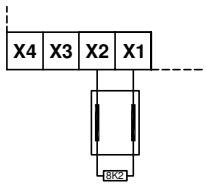
Manual reset



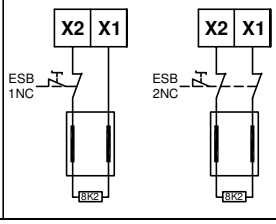
Automatic reset



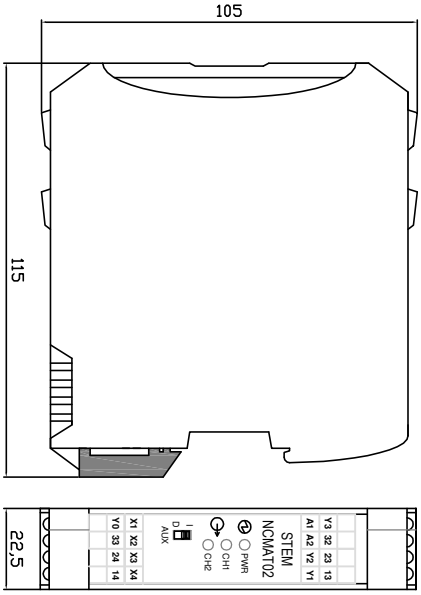
2-wire pressure-sensitive safety device (terminated with 8.2 kOhm resistor)



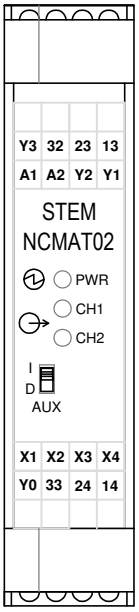
Emergency Stop Button connection



Dimensions (mm)



Front view



Technical data

Parameter	Valore	
Housing material	PA 6.6	
Dimensions	115 x 105 x 22,5 mm	
Weight	165 g	
Operating conditions	Temperature: -5 ... +55 °C	
Storage conditions	Temperature: -25 ... +70 °C	
Degree of protection (IEC 60529)	IP20	
Degree of contamination	2	
Overvoltage category	II	
Assembly	35 mm DIN standard rail	
Connection type	Screw terminals	
Supply voltage (Vs)	12 ÷ 24Vdc ±15%	
Internal fuse on the supply	300 mA PTC	
Current consuption	@24Vdc: 25 mA min, 70 mA max	
Termination resistance of the 2-wire device	Standard = 8.2 kOhm Upper threshold > 13,8 Kohm Lower threshold < 3,8 Kohm	
Safety Outputs switching voltage	10 ÷ 30Vdc	
Maximum switching current	0,5 A	
Minimum switching current	>2 mA	
Safety output switching power	15W	
External fuse at the output	500 mA gG (according to IEC EN 60269-1)	
Safety outputs terminals	13-14, 23-24	
Usage category (SAFETY outputs)	DC-13: 0,5A @ 24 Vdc	
Auxiliary output terminals	32 (NC) - 33 (NO)	
Auxiliary output parameters (resistive load)	PNP Output: V=10 ÷ 30 Vdc (Vs); Imax=0,5A	
OFF state response time	10ms	
Safety category and PL EN ISO 13849-1	Cat.**1** 2-wire pressure-sensitive safety device	Cat.**3** 2-wire pressure-sensitive safety device cat. 3 4-wire pressure-sensitive safety device
PL (EN ISO 13849-1)	PL - **c**	PL - **e**
PFHd (N°cicli / anno)	$1{,}14 \times 10^{-6}$	$4{,}29 \times 10^{-8}$
MTTFd (years)	100	100
TM	20 years (MTTFd=100 years)	
Vibration resistance	EN ISO 13856-1, EN ISO 13856-2, EN ISO 13856-3, EN 81-50, EN61131	
Stop category (EN ISO 13850:2015)	0	
EMC compliance	EN 61326-3-1, EN 55011	
In accordance with	EN 60204-1, EN ISO 13849-1, EN ISO 13850 EN ISO 13856-1, EN ISO 13856-2, EN ISO 13856-3	
Approvals	TUV IT 0948 25 MAC 513 B	

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