

User's manual of safety module NA1/3-C-T



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2 Introduction

This user's manual must be read and completely understood, before operating the safety module, by all the operators who are involved in the design, mounting, maintenance of the safety-related parts of the machine. It has to be preserved in a tidy, dry place, in a position near to the mounting place of the safety module and easily readable by the user.

All the operations described in this user's manual must be performed only by qualified operators, who must follow without any exception all the rules and suggestions of this user's manual.

In the occurrence of any doubt about the content of this user's manual, or in the event of failure of the safety module, avoid any operation on the safety module, and any dangerous situation for the operator and contact immediately SAIET Elettronica.

The risk assessment of the whole system is under the solely responsibility of the user. Following the risk assessment, the user states under his solely responsibility, that this safety device is suitable for the application.

If the safety module NA1/3-C-T is improperly used or not fully fulfilling the requirements of this user's manual, or by operators without sufficient knowledge of the safety instructions and regulations, SAIET Elettronica does not guarantee the correct working of the safety module.

Any guarantee and any safety function is void following opening of the housing or unauthorized modifications.

3 Content of the packaging

Inside the packaging there are:

- 1 safety module, type **NA1/3-C-T**
- 1 user's manual

In the event of damaged packaging or damaged safety module, avoid any operation and installation procedure of the module and contact immediately SAIET Elettronica.

4 Application

The safety module **NA1/3-C-T** can be used to control emergency stop devices (positive guided) characterized by a closed contact when the E-Stop button is not pushed and open when the E-Stop button is pushed.

The safety module has been designed according to safety category 4 of EN 954-1. Three N.O. delayed safety outputs and one auxiliary delayed N.C. output are available. All the outputs are implemented by forced guided safety relays.

The delay from pushing the E-Stop button to the opening of the safety outputs is approximately 1 second. For this reason the safety module NA1/3-C-T is suitable for category 1 emergency stop (EN 60204-1).

5 Normative references

NORMA	ANNO
EN 954-1	1998
EN 60204-1	1998
EN 418	1992
EN 61000-6-2	2002
EN 61000-6-3	2002

Warning! The whole electrical plant of the machine in which is installed the safety module has to be designed according to local regulations.

6 Dimensions

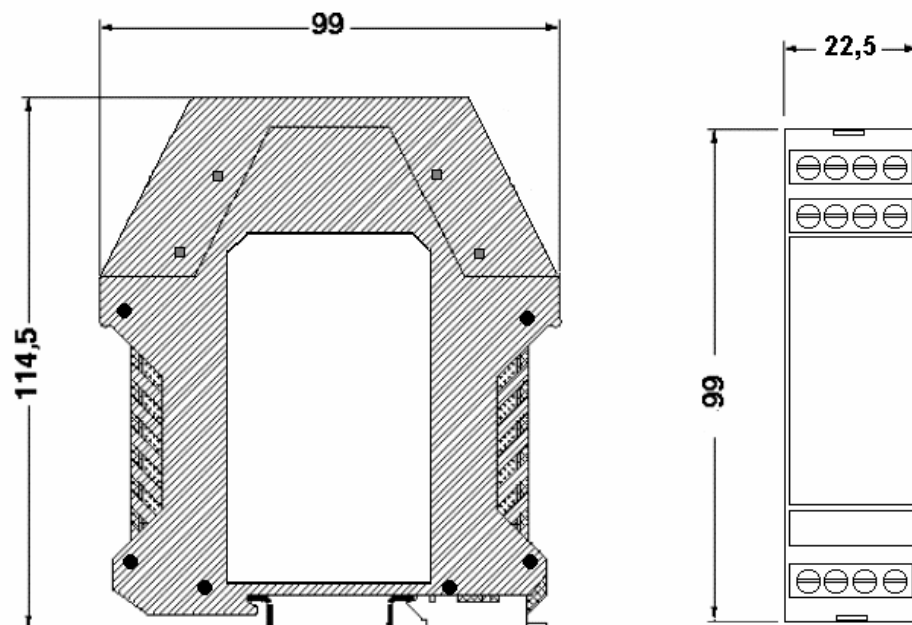


Figure 1: mechanical dimensions of the safety module NA1/3-C-T (front and side view); all dimensions are in mm.

7 Technical data

Parameters	Values
Power supply voltage (U)	AC 18 V _{rms} 50 ÷ 60 Hz, DC 24 V
Voltage Range	U ± 10%
Supply current	50 mA, @ 24 Vdc
Short-circuit protection	PTC 300 mA
Safety Category (EN 954-1 e -2)	4
Emergency stop category (EN 60204-1)	1
Housing material	Polyamide PA 6.6 22,5 mm Flammability Class V-0 (UL94)
Mounting	OMEGA – DIN EN 50022 guide
EMC Compatibility	EN 61000-6-2; EN 61000-6-3
Operating /Storage Temperature	-25 ÷ +55 °C
Operating/Storage Humidity	30 ÷ 85 %
Cable Cross section	0,14 ÷ 2,5 mm ² (stiff wire) 0,14 ÷ 2,5 mm ² (flexible wire)
Weight	200 g
Dimensions	99 × 22,5 × 114,5 mm
Shock resistance	10 g, 11 ms
Vibrations resistance	5 g, 10 ÷ 100 Hz
Protection degree	IP 30
Protection degree of the panel in which the safety module NA1/3-C-T is mounted	Greater or equal IP 54
Safety outputs 13-14, 23-24, 33-34	Characteristics
Function	<p>Open contact: safety outputs open (open circuit, corresponding to a dangerous situation or a detected fault or lacking of power supply)</p> <p>Closed contacts: safety outputs closed (short-circuit, corresponding to the absence of dangerous conditions for the operator)</p>
Maximum switching voltage	250 Vac
Maximum switching current	6 A
Maximum switching capacity	1500 VA

Contact security	External fuse: 4 A
Mechanical service life	10 ⁷
Electrical service life	10 ⁵

Auxiliary Output 41-42	Characteristics
Funzione	<p>Closed contact: safety outputs open (open circuit, corresponding to a dangerous situation or a detected fault or lacking of power supply)</p> <p>Open contact: safety outputs closed (short-circuit, corresponding to the absence of dangerous conditions for the operator)</p>
Contact ratings	See technical data of SAFETY OUTPUTS

Timings	Values
Fall back delay (E_STOP button pushed ⇒ safety outputs open)	1 s ± 20% @ 24 Vdc 0,75 s ≤ Tr ≤ 1,5 s
Start-up delay (START Button pushed ⇒ safety outputs closed)	≤ 100 ms

LED SIGNALLING	Characteristics
POWER	ON = Power supply ON OFF = Power Supply OFF
CH1	CH1 channel ON
CH2	CH2 channel ON

8 Mounting and installation

It is necessary to mount and install the safety module **NA1/3-C-T** following local regulations, with plant or machine powered off and without any dangerous situation for the operator. The safety module has to be installed inside the panel of the machine, in a tidy and dry place and mounted on the appropriate DIN RAIL. The Protection degree of the panel in which the safety module NA1/3-C-T is mounted has to be greater or equal to IP 54.

It is necessary to avoid the possibility that untied cables, wires or material can reach the safety module (leading for example to short-circuit some terminals)

It is necessary that the machinery or the plant can only work within the temperature and humidity range specified in the Technical data of this user's manual.

Avoid any installation procedure during storms.

Do not throw away the packaging.

8.1 Connections

It is necessary to use wiring with length and cross-section suitable for the application. The layout and the connections of the wires have to avoid any risk of cutting and crushing of the cables and must also allow free movements for operators and moving machines. Besides, the wires must not be too tightened.

The choice of the devices to connect to the safety module is under the solely responsibility of the user. Following the risk assessment, the user states under his solely responsibility, that this safety device, together with the connected devices is suitable for the safety category required for the application.

Safety module NA1/3-C-T

Function	Terminals	Connection
<i>Supply</i>	A1	+24 Vdc / 18 Vac
	A2	GND / 18 Vac
<i>START Button</i>	S1 –S2	N.O contact of the START Button
<i>Safety Output N.O.</i>	13-14	N.O. contact, closed (short-circuited) in the absence of dangerous conditions
<i>Safety Output N.O.</i>	23-24	N.O. contact, closed (short-circuited) in the absence of dangerous conditions
<i>Safety Output N.O.</i>	33-34	N.O. contact, closed (short-circuited) in the absence of dangerous conditions
<i>Auxiliary Output N.C.</i>	41-42	N.C. contact, open (open-circuit) in the absence of dangerous conditions

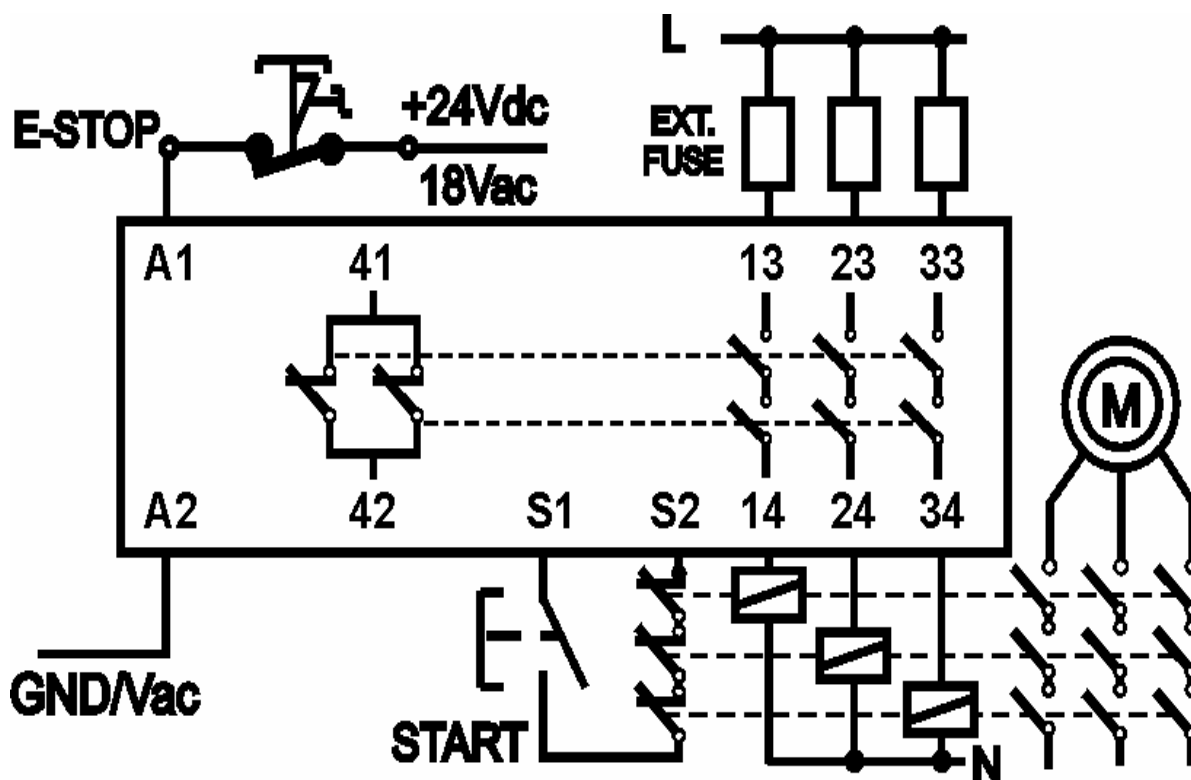


Figure 2: Connection diagram of NA1/3-C-T safety module. Each safety output is protected by a 4A external fuse.

The power supply must be connected to the terminals A1 and A2. In the example of Fig. 2 the safety module is operated by a 1 channel emergency stop button (with positive opening), connected in series to the A1 terminal. The E-Stop button is N.C. type: when the E-Stop button is not pushed, the module is powered on, while when it is pushed, the module is powered off and the safety outputs open with a delay of approximately 1 sec.

The safety outputs can drive three external forced guided contactors: these contactors have a N.C. feedback contact. In order to check the integrity of all the external contactors, it is necessary to connect in series all the N.C. feedback controls of the external contactors.

For automatic start it is possible to connect the series of the N.C. feedback contacts directly to the terminals S1 and S2 of the safety module (the safety outputs close immediately after the releasing of the E-Stop Button).

For manual START it is possible to connect in series to the N.C. feedback contacts a N.O. START button (See fig. 2).

9 Activation procedure

The activation procedure of the safety module NA1/3-C-T must be done every time that the safety module is mounted and/or installed, every time that the connections are modified and also periodically, repeating all the operations described in the following sequence.

All the operations have to be performed in absence of any dangerous condition for the operator.

Point 1: Check of connections and of mounting: it is performed by a visual inspection of the safety module in which the operator has to check the integrity of the module, of the documentation (user's manual and labels), the correctness of the positioning of the module inside the panel of the machine, the correctness of all the connections and of the correct working of all the devices connected to the safety module NA1/3-C-T. The operator must also check all the wirings in order to avoid cutting and crushing and must verify that the wirings are not too tightened.

Point 2: Activation

- Turn ON Connect the power supply with the E-Stop button not pushed: the safety outputs 13-14, 23-24 and 33-34 must be open (open-circuit between the terminals), while the auxiliary output (41-42) must be closed (short-circuit between the terminals). The POWER led must be ON, while CH1 and CH2 LEDs must be OFF.
- Push the start button connected to S1 and S2 (see Figure 2): the safety outputs 13-14, 23-24 and 33-34 close immediately (short-circuit between the terminals), while the auxiliary output (41-42) opens immediately (open-circuit between the terminals). The POWER, CH1 and CH2 LEDs must be ON.
- Push the E-Stop Button: the safety outputs 13-14, 23-24 and 33-34 open with a delay of approximately 1 second (open-circuit between the terminals), while the auxiliary output (41-42) closes with a delay of approximately 1 second (short-circuit between the terminals). The POWER, CH1 and CH2 LEDs must be OFF.
- With E-Stop button pushed, push the START button: the safety outputs 13-14, 23-24 and 33-34 must be open (open-circuit between the terminals), the auxiliary output (41-42) must be closed (short-circuit between the terminals). The POWER, CH1 and CH2 LEDs must be OFF.

10 Maintenance and periodical check

The integrity of the safety module NA1/3-C-T and of all the connected devices must be periodically checked. The frequency of the check depends upon the application: it is part of the risk assessment of the machine or of the plant and it is responsibility of the operators that have to perform the risk assessment.

Dangerous situations and conditions for the operators may occur if the periodical check is not performed at all, or if it is performed with a wrong frequency period or in a wrong way or by operator with insufficient knowledge of the safety instructions and regulations.

The periodical check consists of a complete check of all wirings, connections, mounting and installation of the safety module NA1/3-C-T and of all the devices connected to it. Besides, the check involves the performing of all the tests of the "Activation Procedure" paragraph.

The maintenance procedure consists in a periodical cleaning of the safety module and of all the devices connected to it. In particular, it is necessary to clean the devices from dust, oils, condense. All these operations must be performed with the safety module and machine or the plant powered off and without any dangerous condition or situation for the operators.