Emergency-Stop Relay

Basic Unit
With Cross Monitoring
According to EN 60204-1 and EN 954-1
Single or Dual Channel E-Stop Possible
With Monitoring of the Reset Switch
Rated Voltage in the E-Stop Circuit: 24 V DC (new)

For Example
- Protection of persons and machines
- In conjunction with programmable logic control systems
- Monitoring of sliding safety screens
- Protective measures on industrial robots

Function
Following application of the supply voltage to terminals A1/A2, and if the E-Stop switch is not activated, the relay K1 is energized by the RESET switch. The contacts of relay K1 trigger the relays K2 and K3. The latter become self-locking through their own contacts. At the same time, the relay contacts of K2 and K3 de-energize relay K1. After a drop-out delay time tR this relay goes over into its off-position. After this switch-on phase, the three enabling current paths, which are intended for the output, are activated (terminals connection for: enabling current paths = 13/14, 23/24, 33/34). The flitting contact 53/54 is closed only during the time when K1 is energized. It can be used, e.g., for indicator purposes or to monitor the RESET switch (see ex. A 1017). Three LEDs provide a display, and these LEDs are associated with the safety channels and the power supply.

If the E-Stop switch is activated, the current leads for the K2 and K3 relays are interrupted. The enabling current paths 13/14, 23/24 and 33/34 at the output are opened and the NC 41/42 is closed. With two-channel wiring of the E-Stop circuit, it is possible to monitor the presence of a short circuit in the cables connected to it (cross monitoring). If a fault occurs, the voltage present at Y11/Y21 is short-circuited. This causes the immediate return of the relays K2 and K3 to their off-position and the activation of the protective internal electronic circuitry.

Notes
- Depending on the required degree of safety, the SNO 2002-xx can be wired with or without cross monitoring (see application examples A 1016, A 1017).
- To multiply the enabling current paths, use the expansion units or external power contactors with positive guided contacts.

Approvals

Order Example
SNO 2002-17 24 V DC


**Application Example**

**Dual Channel E-Stop Circuit (with cross monitoring)**

N

The dual channel E-Stop circuit switches off even if one of the two contacts of the E-Stop button does not open. If a fault occurs (e.g. the E-Stop contact connected to Y12 does not open), the safety circuit is activated by the second (redundant) contact Y32. The enabling current paths 13/14, 23/24 and 33/34 open. In case of short circuit in the cables connected to the E-STOP switch, the voltage present at Y11, Y21 is short circuited (cross monitoring). The relays K2, K3 switch back into their off-position and the protective internal circuitry is activated. (*) The RESET switch can be monitored through the fleeting contact 53-54. If the RESET switch is closed before the power supply is applied to terminals Y12 and Y31, or there is a short circuit in the cable, the enabling current paths will remain open. If however, a short circuit in the RESET cable should occur when the relay is already active the cyclic self checking feature of the item will detect it when switching the supply off/on. As a consequence, the enabling current paths will not close and the safety function is guaranteed.

**Application Example**

**AC-Device: Single-Channel E-Stop Circuit**

From the relay K3, both connections (Y31, Y32) are conducted to terminals. In this way, the connection to be switched for the E-Stop button can be selected at will. The opposite side must be set permanently to plus (Y11) or minus (Y21) by a wire shunt. If the terminal (Y32) is permanently connected to minus (Y21) an E-Stop button with only one contact can be used.

**Application Example**

**Dual Channel Safety Gate Monitoring (with cross monitoring)**

N

The position of the safety sliding gate is monitored through channel 1 (Y12) and channel 2 (Y32). The SNO 2002-xx is activated through the RESET switch. If the sliding safety gate opens, the internal safety relays K2 and K3 return to their off-position and the enabling current paths 13/14, 23/24, 33/34 open. If the safety gate is closed again the E-Stop Safety Relay can be activated again through the RESET switch.

**Application Example**

**External Contact Expansion**

If the number of enabled current paths is not sufficient, two external contactors can be used for expansion. They are driven through one of the enabling current paths of the SNO 2002-xx. The function of the external contactors is monitored by their own NC contacts connected in series with the RESET switch to the relay K1 (Y13). The contactors K4 and K5 must have positively guided contacts.
**FUNCTION**
According to EN 60204-1
Function Display
Function Diagram

**POWER SUPPLY DATA**
- Rated Voltage $U_N$ V AC
- Rated Voltage $U_N$ V DC
- Rated Consumption at 50 Hz and $U_N$ (AC) VA
- Rated Consumption at 50 Hz and $U_N$ (AC) W
- Rated Consumption at $U_N$ (DC) W
- Residual Ripple $V_{ss}$ V
- Rated Frequency Hz
- Operating Voltage Range

**CONTROL CIRCUIT**
- only for supplying the control inputs
- Control Output Y11 with respect to Y21:
  - Line Resistance (Control Inputs) Q
  - Rated Output Voltage V DC
  - No-Load Voltage (AC-Unit) V DC
  - Rated Current mA
  - Rated Short-Circuit Current $I_k$ max. mA
  - Fuse
  - Response time (PTC) s
  - Recovery Time (PTC) s
- Control Inputs Y12, Y13, Y14, Y31:
  - Rated Current Input K1 mA
  - Rated Current Input K2, K3 mA
  - Response Time $t_{K1}$ Start-up Cycle K1 ms
  - Release Time $t_K$ for the E-Stop K2, K3 ms
  - Minimum Switch ON-Time $t_{K1}$ for K1 ms

**OUTPUT CIRCUIT**
- Contact Equipment
- Contact Type
- Contact Material
- Switching Voltage $U_{ac}$ V AC/DC
- Maximum Rated Current $I_p$ per Contact A
- Maximum Total Current for all Contacts A
- Application Category According to EN 60947-5-1:1991
- Short-Circuit Protection, Max. Fuse Element Class gG A
- Permissible Switching Frequency Switching Cycle/h
- Mechanical Lifetime Switching Cycles

**GENERAL DATA**
- Creepage and Clearance Distances Between Circuits
- According to DIN VDE 0110-1:04.97: Rated Withstand Voltage kV
- Over-Voltage Category
- Contamination Level
- Design Voltage $U_{ac}$ 50 Hz acc. to DIN VDE 0110-1, Table A.1 kV
- Test Voltage $U_{ac}$ 50 Hz acc. to DIN VDE 0110-1, Table A.1 kV
- Protection Class Housing/Terminals acc. to DIN VDE 0470 Sec. 1:11.92
- Radiated Noise
- Noise Immunity
- Ambient Temperature, Working Range °C
- Dimension Diagram
- Connection Diagram
- Weight kg
- Approvals

**SNO 2002-xx**
- Emergency-Stop Relay
- 3 LED’s green
- FD 0120 W1

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<th>Function</th>
<th>24</th>
<th>115</th>
<th>120</th>
<th>230</th>
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<td>Power Supply</td>
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<td>≤ 40</td>
<td>80</td>
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<td>APPLICATION CATEGORY</td>
<td>AC: Short-Circuit Proof Transformer</td>
<td>DC: PTC-Resistance</td>
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<td>Fuse</td>
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<td>No-Load Voltage (AC-Unit)</td>
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<td>Maximum Current $I_p$ A</td>
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<td>Mechanical Lifetime Switching Cycles</td>
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**GENERAL TECHNICAL SPECIFICATIONS**
- Page i.11