

- ▶ Industrial design
- ▶ Width 45mm
- ▶ Single or dual channel activation
- ▶ 3 N/O safety contacts and 1 N/C control contact
- ▶ Reset switch monitoring
- ▶ Stop-category 0 (according to EN 60204-1)
- ▶ Safety-category 4 (according to EN 954-1)



## ▶ Technical data

### ▶ 1. Functions

Basic unit for emergency stop, safety gates and safety mat applications

### ▶ 2. Indicators

Green LED (SUPPLY) ON: indication of supply voltage  
 Green LED (K2) ON/OFF: indication of relay output  
 Green LED (K3) ON/OFF: indication of relay output

### ▶ 3. Mechanical design

Self-extinguishing plastic housing, IP rating IP40  
 Mounted on DIN-Rail TS 35 according to EN 50022  
 Mounting position: any  
 Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20  
 Initial torque: 0.8 to 1.0Nm  
 Terminal capacity:  
     2 x 2.5mm<sup>2</sup> without multicore cable end  
     2 x 1.5mm<sup>2</sup> with/without multicore cable end

### ▶ 4. Input circuit

Supply voltage:  
     24V DC terminal A1-A2 (ZK31x45 24VDC)  
     115V AC terminal A1-A2 (ZK31x45 115VAC)  
     230V AC terminal A1-A2 (ZK31x45 230VAC)  
 Tolerance: -15% to +10%  
 Rated frequency: 50 to 60Hz  
 Rated consumption:  
     24V DC 1.0W (ZK31x45 24VDC)  
     115V AC 3.2VA(2.5W) (ZK31x45 115VAC)  
     230V AC 3.2VA(2.5W) (ZK31x45 230VAC)  
 Duration of operation: 100%  
 Residual ripple for DC: 2.4V<sub>SS</sub>

### ▶ 5. Output circuit

3 normally open forced safety contacts and 1 normally closed forced control contact  
 Switching capacity: 1380VA (6A/230V AC/DC)  
 Rated current: max. 6A  
 Total current all contacts: max. 18A  
 Fusing: 6A fast acting  
 Mechanical life: 10 x 10<sup>6</sup> operations  
 Switching frequency:  
     3600/h at I<sub>e</sub> 6A / U<sub>e</sub> 230V AC (AC-15)  
     3600/h at I<sub>e</sub> 3A / U<sub>e</sub> 24V DC resp.  
     360/h at I<sub>e</sub> 6A / U<sub>e</sub> 24V DC (DC-13)  
 Rated voltage: 300V AC (according to IEC 664-1)  
 Surge voltage: 4kV, overvoltage category III (according to IEC 664-1)

### ▶ 6. Control circuit

#### (only for supplying the control inputs)

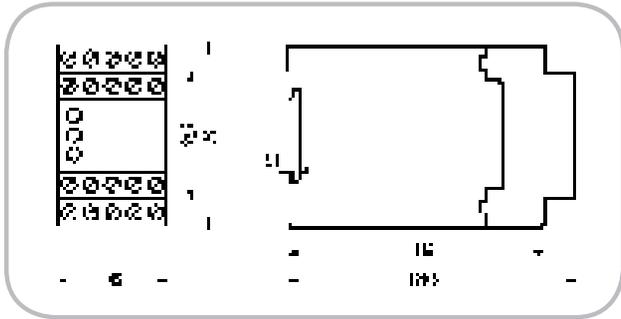
Control contact Y11-Y21:  
 Line resistance: ≤70Ω  
 Galvanically separated A1-A2 to Y11-Y21-PE:  
     Yes (AC units)  
     No (DC units)  
 Rated output voltage: 24V DC  
 No-load voltage: ≤40V DC  
 Rated current: 40mA  
 Short circuit current I<sub>K</sub>: 1000mA  
 Fusing: PTC-resistor (DC) resp. short-circuit proof transformer (AC)  
 Response time PTC: 3s  
 Recovery time PTC: 2s

Control contact Y12, Y13, Y14, Y31:  
 Rated current:  
     Y13, Y14 40mA  
     Y12, Y31 15mA  
 Response time t<sub>A1</sub> K2, K3 80ms (with RESET-monitoring)  
 Response time t<sub>A2</sub> K2, K3 500ms (without RESET-monitoring)  
 Release time t<sub>R</sub> K2, K3 50ms (E-stop)  
 Release time t<sub>R1</sub> 100ms (interruption of supply voltage)  
 Simultaneity time t<sub>S</sub>: ≤500ms  
 Switch-on time t<sub>M</sub>: K1 min. 50ms  
 Standby time t<sub>B</sub>: ≥100ms (AC units only)  
 Reset time t<sub>W</sub>: 500ms (without RESET-monitoring)

### ▶ 7. Ambient conditions

Ambient temperature: -25 to +55°C (according to IEC 68-1)  
 Storage temperature: -25 to +70°C  
 Transport temperature: -25 to +70°C  
 Relative humidity: 83% (at 23°C), 93% (at 40°C) according to DIN 50016  
 Pollution degree: 3 outside, 2 inside (according to IEC 664-1)

## Dimensions



## Functions

### Basic unit for emergency stop, safety gates and safety mat applications

After the supply voltage is applied to terminals A1/A2, and if the E-stop momentary contact switch is not activated the relay K1 is energised with the RESET switch. The control logic of relay K1 triggers 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-energise K1 which releases.

After this switch on period, the three enabling current paths (terminals 13/14, 23/24, 33/34), which are intended for the output, are closed and one control contact is opened (terminals 41/42). Three LEDs provide a display, and these LEDs are associated with the safety channels K2, K3 and the supply voltage.

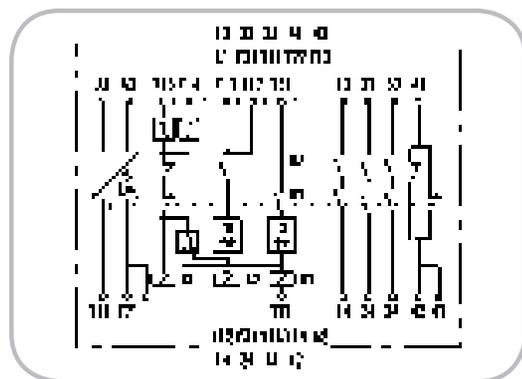
If the E-stop switch is activated, the current leads for the K2 and K3 relays are interrupted. The enabling current paths are interrupted and the control contact is closed. With two-channel wiring of the E-stop circuit, it is possible to monitor the presence of a short circuit in the cables connected (cross monitoring) and ground faults. An internal electronic circuit protects the emergency stop relay from damages. After eliminating the fault the item will return into operation within 2s.

### Reset switch monitoring

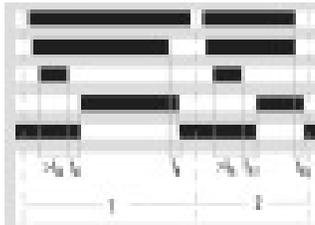
The emergency stop safety relay can be operated with or without reset switch monitoring. In case of connection with reset switch monitoring (terminal Y13) the activation of the item occurs only with the falling edge of the RESET key. This means that only a static operation of the item is possible with this function. To start the item the RESET key has to be closed and then released. In this case an automatic start of the item by using a jumper for the RESET key cannot be performed.

Operation without monitoring the RESET switch (device connection Y14) is suitable for dynamic operation (automatic start). The RESET switch can be shunted. This application can be used for protective screens.

## Connections

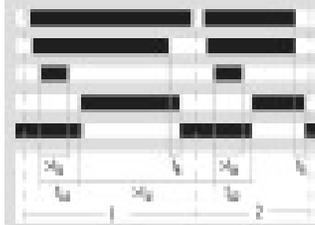


### E-stop application including reset monitoring



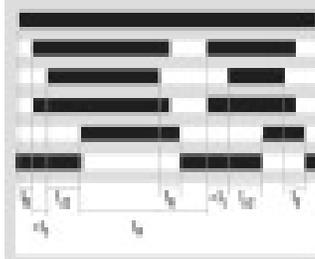
- A1/A2 supply voltage, LED SUPPLY
- Y12, Y31 E-stop
- Y13 Reset (with reset switch monitoring)
- K2, K3 13/14, 23/24, 33/34, LED K2, LED K3
- 41/42
- $t_{A1}$  response time (reset monitoring)
- $t_R$  release time at E-stop (Y12, Y31)
- $t_{R1}$  release time at supply voltage breakdown
- $t_M$  minimum activation time
- 1 E-stop via Y12, Y31
- 2 supply voltage breakdown (A1/A2)

### E-stop application without reset monitoring



- A1/A2 supply voltage, LED SUPPLY
- Y12, Y31 E-stop
- Y14 Reset (without reset switch monitoring)
- K2, K3, 13/14, 23/24, 33/34, LED K2, LED K3
- 41/42
- $t_{A2}$  response time (without reset switch monitoring)
- $t_R$  release time at E-stop (Y12, Y31)
- $t_{R1}$  release time at supply voltage breakdown
- $t_M$  minimum activation time
- $t_W$  reset time
- 1 E-stop via Y12, Y31
- 2 supply voltage breakdown (A1/A2)

### Protective door application



- A1/A2 supply voltage, LED SUPPLY
- Y12 protective door contact channel 1
- Y22 protective door contact channel 2
- Y14 reset
- K2, K3, 13/14, 23/24, 33/34, LED K2, LED K3
- 41/42
- $t_{A2}$  response time
- $t_B$  stand-by time >100ms (Ac units only)
- $t_R$  release time
- $t_S$  simultaneity time
- $t_W$  reset time