

# ELMON

Sicherheitsschaltgerät / Safety Relay / Relais de sécurité

**ASD** Safety  
Solutions

## ELMON rail 39-726



**Betriebsanleitung** (Original, Gültigkeit siehe letzte Seite)  
ELMON rail 39-726 Sicherheitsschaltgerät

Seite 3-14

Deutsch

**Operating Manual** (see last page for validity)  
ELMON rail 39-726 Safety Relay

Page 15-26

English

**Manuel d'utilisation** (Validité voir la dernière page)  
ELMON rail 39-726 Relais de sécurité

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Français

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**We reserve the right to make technical and operationally relevant changes to the products and devices described in this documentation at any time and without prior notice.**

## 2. General safety regulations and protective measures

- The manufacturer and users of the plant / machine on which the protection is being used are responsible for implementing and following all applicable safety regulations and rules.
- When used in conjunction with the higher-order controller, the protection guarantees functional safety, but not the safety of the entire plant / machine. The safety of the entire plant / machine must, therefore, be assessed in accordance with machinery directive 2006/42/EC or appropriate product norm before using the device.
- The operating instructions must always be available at the place of installation of the protection. They must be read thoroughly and observed by all persons involved in the operation, maintenance and servicing of the protection.
- The protection must only be installed and commissioned by professionals familiar with these operating instructions and the applicable operational safety and accident prevention regulations. All of the instructions provided in these operating instructions must be observed and followed. All electrical work must only be performed by skilled electricians.
- All electrical work must only be performed by skilled electricians. All relevant electrical engineering and Employer's Liability Insurance Association safety regulations must be observed.
- During work on the switching unit, it is to be switched to zero potential, checked to ensure that it is at zero potential and protected against being restarted.
- The switching unit does not contain any components that require servicing by the user. Unauthorised conversions and repairs made to the switching unit will void all guarantees and the manufacturer's liability.
- Auxiliary outputs must not perform any safety-related functions. They are not one-fault safe and do not undergo a test.

English



**For the design of the safety system to conform to engineer standards, the plant / machine must be professionally inspected at appropriate intervals for proper function. The inspection must be documented in such a way as to be comprehensible at all times.**

**The manufacturer assumes no liability in the event of non-observance or intentional abuse.**

## ELMON rail 39-726 Safety Relay



### 3. General information and functional description

The switching unit ELMON rail 39-726 is used for evaluating safety contact mats and for safeguarding locations where there is a risk of crushing and cutting through the use of safety contact edges and safety bumpers.

Two separate ASO sensors can be connected to the switching unit. Monitoring of the standby current is made possible by an integrated terminating resistor in the sensors. According to the configuration, the monitoring state of the sensors is indicated by the outputs as combined function or as separated function.

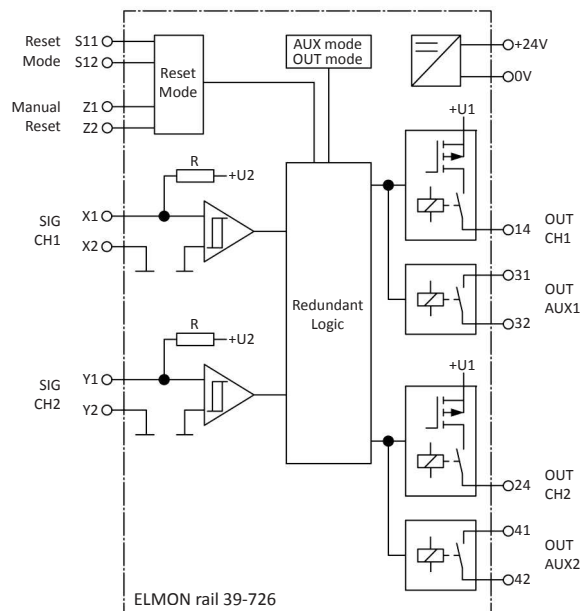
Two safety outputs with non-isolated semiconductor outputs are available. If the idle state is detected at the safety edges and if there are no faults present in the device, a voltage is output at the respective safety outputs (corresponds to the supply voltage).

Two auxiliary outputs with potential-free switching contacts are available. Actuation of the sensors triggers a reaction by the auxiliary output according to the DIP switch configuration. The auxiliary outputs must not perform any safety functions. They are not one-fault safe and do not undergo a test.

The switching unit is designed and type-approved in accordance with EN ISO 13849-1 „Safety-related parts of control systems“ for category 3 Performance Level d. For Category 3 compliance, the safety outputs units have a redundant and diverse design with two independent switching elements; of these, the semiconductor switch's ability to turn off is constantly tested.

The monitoring state of the sensors and the auxiliary outputs, as well as the applied operating voltage are indicated by LEDs.

If an error is present, all the safety outputs are not active.



English

# ELMON

Safety Relay

## 4. Proper use

The switching unit can only fulfil its safety-related task if used properly.

The switching unit is intended to be used as protection in combination with safety contact mats, safety bumpers and safety contact edges with 8.2 kΩ resistor for standby-current monitoring.

Any uses above and beyond these uses constitute improper use. The manufacturer assumes no liability for damages arising from improper use.

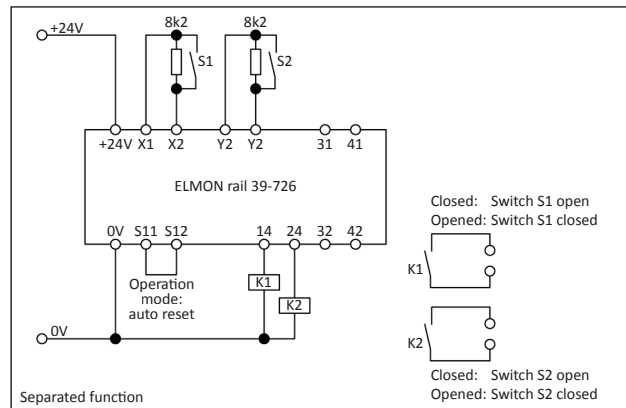
The device may only be used in special applications with the manufacturer's express consent.

## 5. Application examples

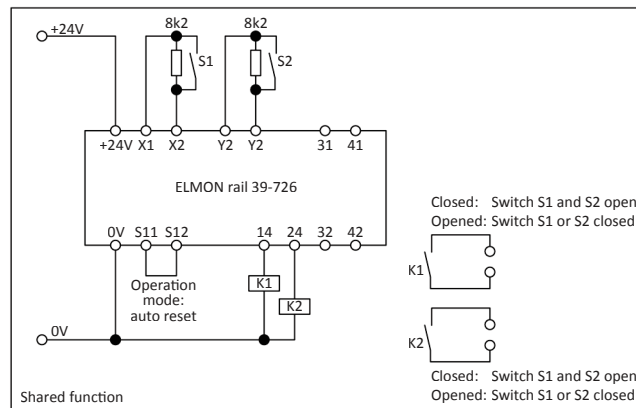
Circuit diagram in zero-potential state. Sensor not actuated.

The auxiliary relay output is used for visualising the switching state of the safety contact edge.

### 5.1 Example of use for separated function



### 5.2 Example of use for combined function



English

## ELMON rail 39-726 Safety Relay



### 6. Device overview

#### 6.1 Versions

Housing, 22.5 mm wide, made of polyamide for 35 mm DIN rail mounting acc. to EN 60715.

#### 6.2 Signal indicators

**LED Power green**

operating state (on)  
error message (pulse output)

**LED CH 1 red**

sensor actuated (on)  
sensor circuit interrupted (flashes fast)  
error lock (flashes slowly)

**LED CH 2 red**

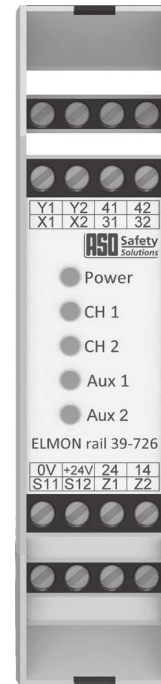
sensor actuated (on)  
sensor circuit interrupted (flashes fast)  
error lock (flashes slowly)

**LED AUX 1 yellow**

Auxiliary output switched

**LED AUX 2 yellow**

Auxiliary output switched



If no error is present, then LED Power shows the operating state (on). During the output of an error message, the number of output pulses indicates the error:

Pulse	Error message
1	Voltage supply outside of the valid value range
2	Testing sensor input faulty
3	Output control CH1 faulty
4	Output control CH2 faulty
5	Data transmission between microcontrollers faulty

#### 6.3 Connection terminals

<b>+24V 0V</b>	Supply voltage 24 V DC, ± 10%
<b>X1 X2</b>	Connection sensor 1
<b>Y1 Y2</b>	Connection sensor 2
<b>14</b>	Relay switching contact 1
<b>24</b>	Relay switching contact 2
<b>31 32</b>	Switching contact auxiliary output 1
<b>41 42</b>	Switching contact auxiliary output 2
<b>Z1 Z2</b>	Connection - manual reset/restart (button NO; optional)
<b>S11 S12</b>	Coding inputs mode

English

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Safety Relay

## 6.4 DIP switches for setting the operating mode

Located on the right side of the housing are six DIP switches.

- S1** «ON» safety output - combined function (OUT1, OUT2: CH1 + CH2)  
«OFF» safety output - separated function (OUT1: CH1; OUT2: CH2) (factory setting)
- S2** «ON» auxiliary output - combined function (AUX1, AUX2: CH1 + CH2)  
«OFF» auxiliary output - separated function (AUX1: CH1; AUX2: CH2) (factory setting)
- S3** «ON» Mode auxiliary output AUX1: RL  
«OFF» Mode auxiliary output AUX1: RLU (factory setting)
- S4** «ON» Mode auxiliary output AUX2: RL  
«OFF» Mode auxiliary output AUX2: RLU (factory setting)
- S5** «ON» auxiliary output AUX1 and AUX2 flash on RLU  
«OFF» auxiliary output AUX1 and AUX2 do not flash on RLU (factory setting)
- S6** «ON» Auxiliary output AUX1 and AUX2 are active in the idle state on RLU  
«OFF» Auxiliary output AUX1 and AUX2 are inactive in the idle state on RLU (factory setting)

## 7. Operating modes

### 7.1 Automatic reset

(S11 S12 bridged)

Following rectification of a fault in a sensor circuit or after a power failure, the switching unit automatically re-enables the output.

### 7.2 Error lock - manual rese

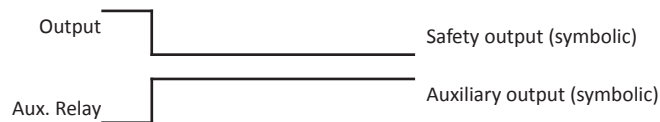
(S11 S12 not connected)

Following rectification of a fault in a sensor circuit or after a power failure, the switching unit does not release the output(s) until contacts **Z1** and **Z2**, 500 ms after the elimination of the disruption, are closed with a button. An automatic restart is thereby rendered impossible. Permanent bridging of contacts **Z1 Z2** does not result in an automatic reset.

### 7.3 Auxiliary output undelayed (RLU)

(S3 = «OFF» or S4 = «OFF»; S5 = «OFF»)

In this operating mode, the corresponding auxiliary output is activated without delay if any error is signalled on the respective channel. The auxiliary output can be toggled between normally closed contact and normally open contact with **S6** („ON“ = normally closed contact), whereby the output is always inactive while the switching unit is in a power-free state.



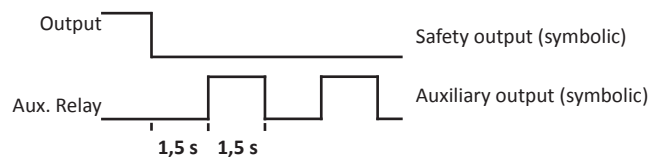
## ELMON rail 39-726 Safety Relay



### 7.4 Auxiliary output undelayed flashing (RLU)

(S3 = «OFF» or S4 = «OFF»; S5 = «ON»)

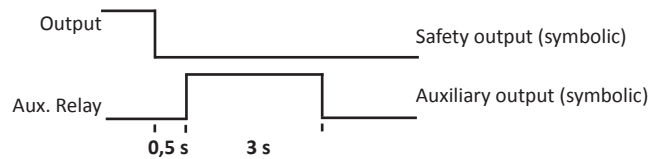
With this DIP switch, flashing of the auxiliary output AUX1 and AUX2 can be activated on mode RLU.



### 7.5 Auxiliary output delayed (RL)

(S3 = «ON» or S4 = «ON»)

In this operating mode, the respective auxiliary output is activated with a delay of approx. 0.5 second and then remains active for max. 3 seconds if an error is signalled.



English

## 8. Mechanical mounting



The switching unit must be professionally mounted:

- In a dust- and moisture-protected switching cabinet or housing.
- Installation in a Pollution Degree 2 environment.
- With a protection class of at least IP54.
- On a 35 mm DIN mounting rail acc. to EN 50 022.

The switching unit must not be mounted in the immediate vicinity of strong sources of heat.

The switching unit may be mounted in any orientation.



## 9. Electrical connection

The switching unit facilitates operation with a supply voltage of 24 V DC  $\pm$  10%.

All applied voltages must comply with the requirements for Safety Low Voltage (SELV). The outputs are not galvanically isolated from the supply voltage.



- Connecting to the wrong terminals can destroy the switching unit.
- Cables installed outdoors or outside of the switching cabinet must be protected appropriately.

The signal cable must not be placed parallel to the motor cable or other power cables.

### 9.1 Connecting the supply voltage

Connect 24 V DC supply voltage to terminals **+24 V 0 V**.

The supply voltage used must comply with the requirements for safety low voltage (SELV).

The supply line to the switching unit must be protected with an appropriate fuse.

### 9.2 Connecting the sensor

Connect sensor to terminals **X1 X2** or **Y1 Y2**.

If a channel is not used, it must be connected to an 8.2 k $\Omega$  resistor.

### 9.3 Connecting multiple sensors per sensor circuit



**ASO-sensors must not be connected in parallel.**

English

One or more sensors can be connected to sensor input. For this purpose, the individual sensors are connected in series according to figure 1.

#### Safety edges SENTIR edge:

Up to five SENTIR edge may be connected in series. The maximum total length of the SENTIR edge shall not exceed 100 m.

The length of one SENTIR edge may be up to 25 m.

The total cable length of the in series connected SENTIR edge must not exceed 25 m.

#### Safety bumper SENTIR bumper:

Up to five SENTIR bumper may be connected in series. The maximum total length of the SENTIR bumper shall not exceed 15 m.

The length of one SENTIR bumper may be up to 3 m.

The total cable length of the in series connected SENTIR bumper must not exceed 25 m.

#### Safety contact mat SENTIR mat:

Up to ten SENTIR mat may be connected in series. The maximum total area shall not exceed 10 m<sup>2</sup>.

The maximum size of a SENTIR mat is 1350 x 2350 mm.

The total cable length of the in series connected SENTIR mat must not exceed 25 m.

Before connecting the sensors that are connected in series, it is recommended that the resistance value of the arrangement is to be measured. The resistance must be 8.2 k $\Omega$   $\pm$  500  $\Omega$  when the sensor is inactive and must not exceed 500  $\Omega$  when it is active.

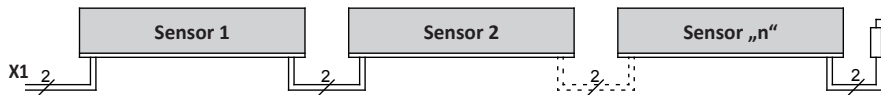


Figure 1: Wiring of multiple sensors; in this example: safety contact edge

#### **9.4 Connecting the control circuits**

Connect the control circuit that is to be monitored to terminals **14** or **24** respectively. The cables are to be laid so that it is impossible to bridge the safety contacts, e.g. by a short circuit between the two connection wires.

The connection for the control circuits is permitted only for switching low voltages. The control circuits are dependent on the rated current to protect with an appropriate fuse or the rated current to the control circuits must be limited by other measures to the maximum value.

#### **9.5 Special features of the safety-related semiconductor outputs (OSSD)**

The output's ability to turn off is also constantly tested while the safety outputs are activated. For this purpose, the semiconductor output switch is switched off several times per second for less than 1 ms and the response at the output observed.

These interruptions must not be evaluated by the higher-order controller as safety requests.

If the voltage does not return to 0 V, the device is permanently deactivated and can only be reset by switching off and on the voltage supply.

This permanent deactivation also occurs if, depending on the type of activation, the voltage cannot break down (e.g. by means of capacitive elements).

A primary controller should only evaluate the states of the output signal if the level is sustained for 5 ms. This prevents pulses generated during a self-test while in the switched-on state and the testing of the switch-on procedure from erroneously being processed as control information.

#### **9.6 Reset terminal**

For automatic reset / restart terminals **S11 S12** are to be bridged (factory setting: manual reset, **S11 S12** unbridged) and reset push-button is to be connected to terminals **Z1 Z2**.

#### **9.7 Auxiliary terminal**

The auxiliary terminals serve only as auxiliary terminals (signalling, display, etc.) and must not perform any safety functions.

### **10. Commissioning and functional test**

The plant / machine must be tested for proper function after all of the electrical connections have been established and the supply voltage has been turned on.

Upon successful commissioning, a voltage is output at the safety outputs (corresponds to the supply voltage). Actuation of the sensor causes a reaction by the safety outputs and by the auxiliary outputs according to the DIP switch configuration.

The safety system must be professionally inspected at appropriate intervals. The inspection must be documented in such a way as to be comprehensible at all times. The requirements of the plant/machine manufacturer are to be taken into account and followed.

## 11. Error diagnosis

Only the green LED may illuminate if the supply voltage has been correctly connected. If one of the red LEDs illuminate, there is an error in the system which can be pinpointed with the aid of the LED.

The **yellow** LEDs for the auxiliary outputs illuminate according to the DIP-switch settings.

LED	Error	Error correction
No LED illuminates	The supply voltage is missing, too low or has been connected incorrectly	Check connections and supply voltage: - 24 V DC at terminals <b>+24 V 0 V</b> - Correct polarity? +24 V at terminal <b>+24 V</b> Tolerance range: $\pm 10\%$
<b>green</b> LED flashes cyclically (pulse output)	Internal error is indicated by the number of pulses.	See -> Signal indicators
<b>red</b> LED is illuminated ( <b>CH1</b> or <b>CH2</b> )	The corresponding safety sensor detected as having been actuated.	- Check the connections of the corresponding sensors (squeezed or brittle supply lines, etc.) - Check sensors *
<b>red</b> LED flashes fast ( <b>CH1</b> or <b>CH2</b> )	sensor circuit interrupted, Sensor(s) not connected, connected incorrectly or faulty.	- Check the connections of the corresponding sensors (squeezed or brittle supply lines, etc.) - Check sensors *
<b>red</b> LED flashes slowly ( <b>CH1</b> or <b>CH2</b> )	error lock	Perform manual reset

\* If the error is not in the wiring, the function of the electronics can be tested by connecting an 8.2 k $\Omega$  resistor to the sensor input on the switching unit. If the electronics work perfectly after performing the test, the sensor must be checked using an ohmmeter. To do this, the connection of the sensor to the switching unit must be disconnected and connected to an ohmmeter. The resistance must be 8.2 k $\Omega$   $\pm 500$   $\Omega$  when the sensor is inactive and must not exceed 500  $\Omega$  when the sensor is active.

## 12. Taking out of service and disposal

The products manufactured by ASO are intended solely for commercial use (B2B). At the end of use, the products are to be disposed of according to all local, regional and national regulations. Products can also be returned to ASO, which will then dispose of them properly.

## ELMON rail 39-726 Safety Relay



### 13. Technical specifications

#### Supply voltage

Low voltage:  $U_E$  24 V DC  $\pm 10\%$  (SELV)

Power consumption  $P_{E\_max}$  < 1 W (24 V DC)

#### Terminating resistor – sensor

Nominal value  $R_{nom}$  = 8,2 k $\Omega$

Upper switching point  $R_{AO}$  > 12,0 k $\Omega$

Lower switching point  $R_{AU}$  < 5,0 k $\Omega$

#### Safety outputs (OSSD)

max. switching voltage  $U_{O\_max}$  26,4 V DC

max. switching current  $I_{O\_max}$  2 A DC (output per)

Electrical life-time >  $10^5$  actuations

Utilization category DC-13 (30 V; 2 A; 1000000 Op.)

#### Switching times - safety output

Switching off delay (Response time)  $\leq 4$  ms

Switching on delay 500ms (Power on 700ms)

#### Auxiliary output

Max. switching voltage 50 V AC/DC

Max. switching current 2 A AC/DC

Mechanical life-time >  $5 \times 10^6$  actuations

#### Switching times - auxiliary output

RL-function:

Switching on delay 0,5 s  $\pm 0,2$  s

Switching off delay 3 s  $\pm 1$  s

With the RLU function, the auxiliary relay switches in synch with sensor actuation.

#### Enclosure

Polyamide PA 6.6

Self-extinguishing acc. to UL 94-V2

Dimensions (HxWxD) 99 x 22,5 x 114 mm

Degree of protection IP20

Weight approx. 160 g

Temperature range -20 °C to +55 °C

#### Connection cable cross-section

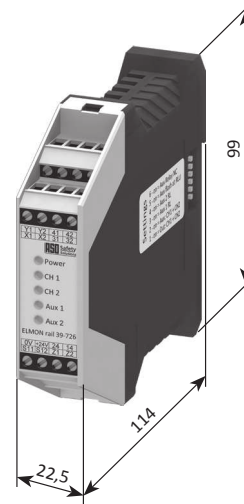
single- or fine-stranded cable 0,75-1,5 mm<sup>2</sup>

#### Certifications

EN ISO 13849-1:2008 category 3 PL e  
(MTTFd 182 years, DC 94,67 %)  
EN 62061:2013 SILCL 3  
(PFHd 1,13E-08 1/h = PFHd1+ PFHd2)

Electronics MTTFd 351 years, DC 99 %  
PFHd1 = 3,79E-09 1/h

Electromechanics B10d 2000000  
MTTFd 380 years, DC 90% (Nop 52560)  
PFHd2 = 7,51E-09 1/h



English

## 14. EC declaration of conformity

We hereby declare that the following products of type series:

**ELMON rail 39-726** (Part no 1119-0010, serial number format yymmnnnnn)

**ELMON rail 39-726 STI** (Part no 1119-0020, serial number format yymmnnnnn)

Safety relay to be used in combination with safety contact edges, safety contact mats and safety contact bumpers for preventing dangers at locations where there is a risk of crushing and cutting satisfies the relevant essential health and safety requirements of the EC directives listed below on account of its design and construction, as does the version brought to market by us:

### **Machinery directive 2006/42/EC**

EN ISO 13849-1:2008

EN ISO 13849-2:2008

EN 61000-6-2:2005

EN 61000-6-3:2007

### **EC - type approval**

Notified Body 0044

TÜV NORD CERT GmbH

Langemarckstraße 20

D-45141 Essen

EC type-examination no.: 44 205 13 176205

This declaration of conformity does not relieve the designer / manufacturer of the machine from his obligation to ensure that the conformity of the entire machine to which this product is attached satisfies the corresponding EC directive.

### **Manufacturer and attorney of documents:**

ASO, Antriebs- und Steuerungstechnik GmbH,  
Hansastraße 52, D-59557 Lippstadt

