

Switching devices

ESD, ESR, ESA, ESP and EsGate

Simple, flexible, safe

- Easy installation
- Can be configured for an extremely wide range of applications
- High level of safety thanks to tried-and-tested technology

Switching devices

Overview

The available switching devices monitor the connected contact mats/safety edges for activation and circuit integrity. The status of the connected sensors can be read off a clear LED/LCD display. The user-friendly devices have easy programming and start up.



Switching devices selection table

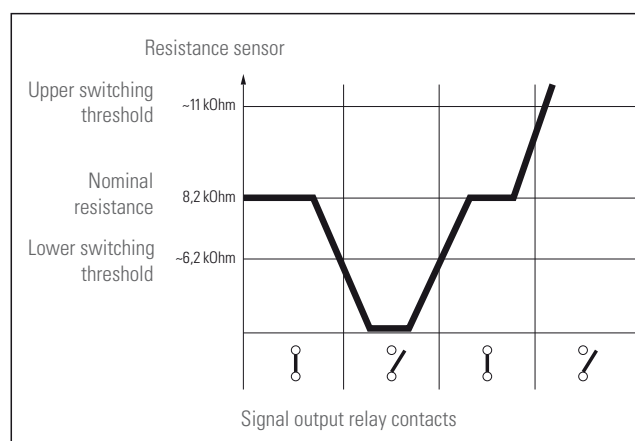
| PL and cat. according to EN ISO 13849-1 | Design Protection Class | Sensor inputs | Safety outputs | Voltage [V] | Application | Bircher designation | Page |
|---|-------------------------|---------------|----------------|-------------|--------------|---------------------|-------|
| PLe, cat. 3 | IP 30 | 2 | 2 | 24/100–240 | Gate | EsGate 3 | 5 |
| PLd, cat. 2 | IP 30 | 2 | 2 | 24/100–240 | Gate | EsGate 2 | 5 |
| PLe, cat. 3 | IP 30 | 2 | 2 (in series) | 230/115/24 | Gate/Machine | ESD 3 | 6/7 |
| PLe, cat. 3 | IP 30 | 2 | 1 | 24 | Gate/Machine | ESR 31C | 8 |
| PLe, cat. 3 | IP 30 | 2 | 1 | 230/115/24 | Gate/Machine | ESR 32 | 8 |
| PLd, cat. 2 | IP 30 | 2 | 1 | 24 | Gate/Machine | ESR 25 | 9 |
| PLd, cat. 2 | IP 30 | 2 | 2 | 24 | Gate/Machine | ESR 26 | 9 |
| PLd, cat. 2 | IP 65 | 1 | 1 | 230/24 | Gate/Machine | ESA/ESP | 10/11 |
| PLc, cat. 1 | IP 30 | 2 | 1 | 230/24 | Gate/Machine | ESR 11 | 8 |
| PLc, cat. 1 | IP 30 | 2 | 2 | 230/24 | Gate/Machine | ESR 12 | 8 |

Function

Sensors with a terminating resistor of 8.2 kOhm are connected and monitored for a change of the quiescent current.

Whenever one or multiple sensors are activated, the total resistance falls towards zero Ohm. In the process, the resistance dropping below the defined switching threshold the switching state of the outputs changes and the yellow or orange status LED lights up.

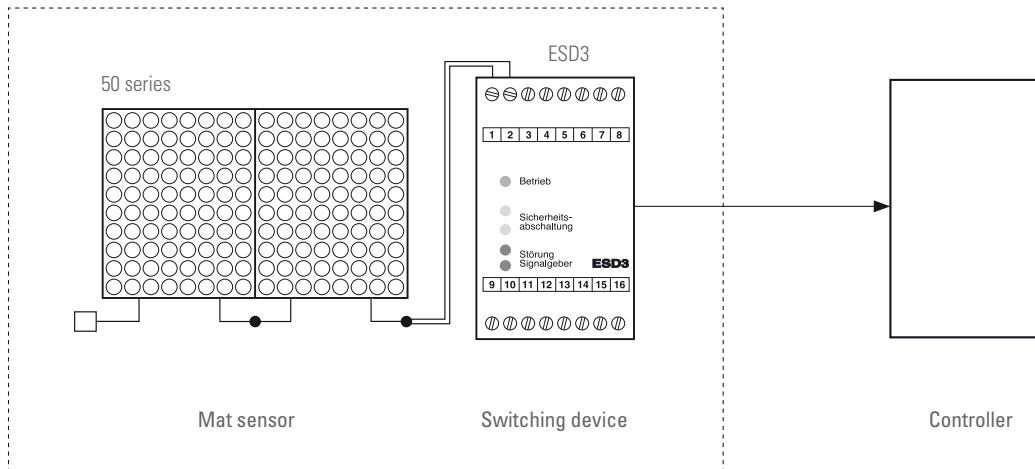
If the sensor circuit is interrupted, the total resistance increases to infinity. In the process, the resistance rising above the defined switching threshold the switching state of the outputs changes and the red status LED lights up.



Switching devices

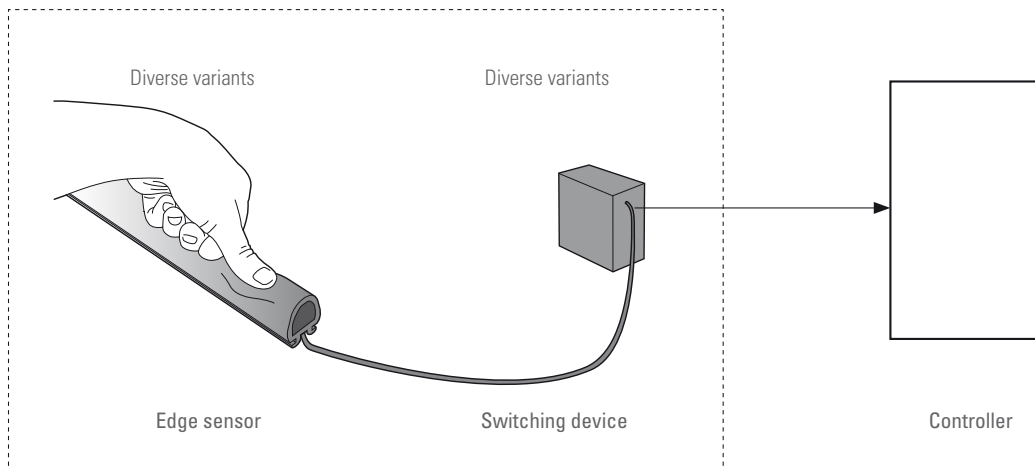
Approvals: Schematic design

A) Type-tested safety mat according to MRL 2006/42/EG, EN ISO 13856-1 and EN ISO 13849-1*



- Safety mat systems connection:
Maximum total area of the sensor 5 m²
- The sensors are connected in series
- All of the systems are connected at a resistance of 8.2 kOhm

B) Type-tested safety edge according to MRL 2006/42/EG, EN ISO 13856-2 and EN ISO 13849-1*



- Safety edge systems connection:
Maximum total length of the sensor 25 m
- The sensors are connected in series (ENT-R contact strips max. 4 pieces in series)
- All of the systems are connected at a resistance of 8.2 kOhm

* The switching devices are type tested as a system in combination with Bircher Reglomat safety mats or safety edges.

Switching devices

Applications in combination with safety mats

Situation

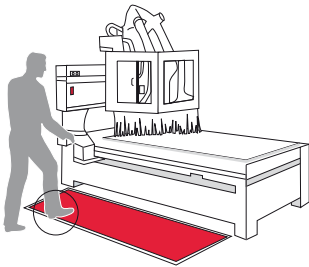
Machine safety

Solution

- Protection of hazardous areas in machines with safety mats combined with an ESD3 safety switching device

Tip

- Combination of multiple safety mats to protect larger areas



Situation

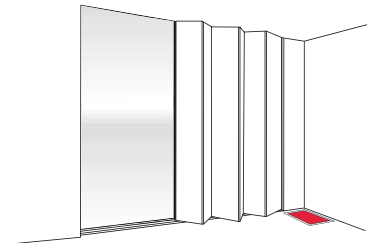
Folding door

Solution

- Protection of the door folding area with a safety mat combined with an ESD3 safety switching device

Tip

- Combination of a safety edge and an RFGate radio transmission system to protect the closing edge of the door



Situation

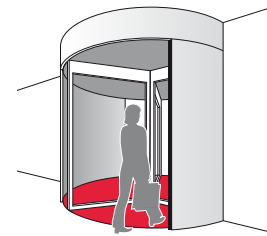
Revolving door

Solution

- EsGate safety switching device in combination with safety edges

Tip

- Using safety mats to protect revolving doors



Applications in combination with safety edges

Situation

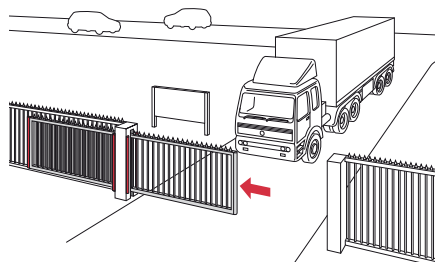
Sliding gate at site entrance

Solution

- Safety switching edge systems for the four stationary and two mobile safety edges

Tip

- Combine with RFGate radio transmission system for the mobile safety edge



Situation

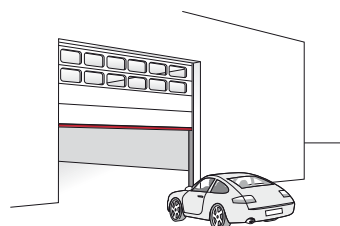
Sectional door and gate

Solution

- Protect the closing edge with a safety edge and a safety switching device

Tip

- Optimum protection because of mobile safety edges acc. to cat. 2 or cat. 3
- Herkules 2 gate radar as opening sensor. It distinguishes between vehicles and people



Situation

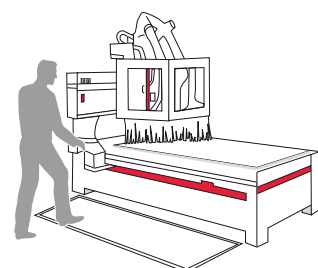
Milling or grinding machine with automatic protective door

Solution

- Protection of moving parts with a safety edge and a safety switching device

Tip

- Combine with contact mat systems



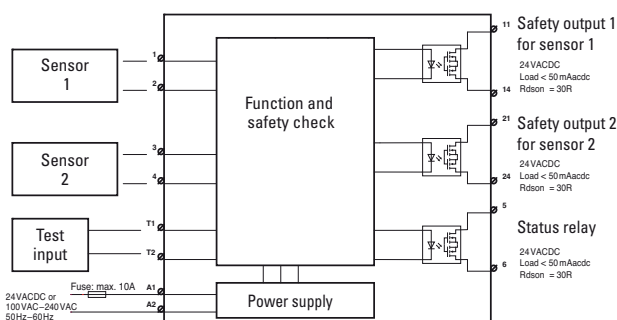
Switching devices



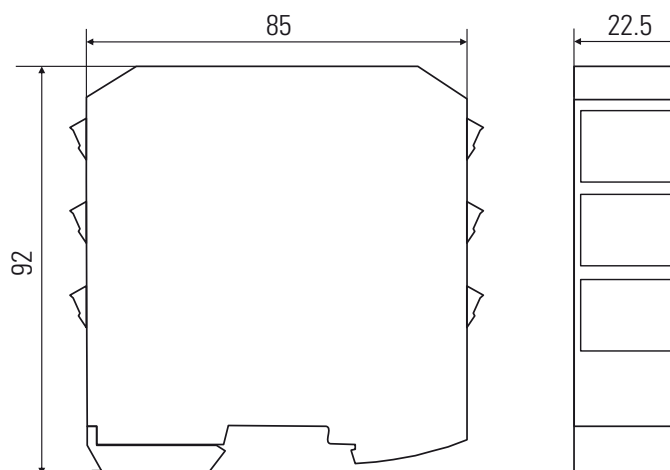
EsGate 2 / EsGate 3

- Housing, polyamide red/grey
- EsGate 2 with external test input
- EsGate 3 is self-monitoring
- Performance level d/e, cat. 2/3 acc. to EN ISO 13849-1
- Individually configurable
- Integrated resistance display
- Truly two-channel
- For DIN mounting rail
- Illuminated LCD
- EN 12978

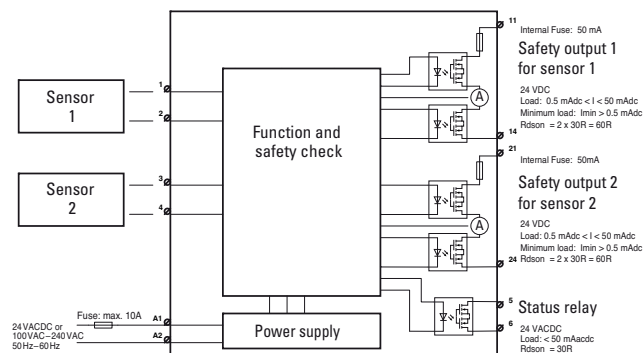
EsGate 2 block diagram



EsGate dimensional drawing



EsGate 3 block diagram



Specific technical data

| | |
|--------------------------------|--|
| Power consumption | Max. 2 VA |
| Response time | < 20 ms |
| EsGate 2 (PL d / Cat 2) | |
| Safety outputs | Semiconductor relay 24 V ACDC, < 50 mA, Rdson: approx. 30 Ohm |
| Status relay | Semiconductor relay 24 V ACDC, < 50 mA, Rdson: approx. 30 Ohm |
| Test input | 24 V ACDC ± 15% 2 mA not activated = normal operation, activated = test |
| EsGate 3 (PL e / Cat 3) | |
| Safety outputs | Semiconductor relay 24 V DC, 0.5 mA DC up to 50 mA DC, Rdson: approx. 60 Ohm |
| Status relay | Semiconductor relay 24 V ACDC, < 50 mA, Rdson: approx. 30 Ohm |

Switching devices



ESD3

- Housing, ABS grey/black
- Performance level e, cat. 3 acc. to EN ISO 13849-1
- For safety mats acc. to EN ISO 13856-1/
for safety edges acc. to EN ISO 13856-2
- Auto-, external reset
- Redundant signal evaluation
- Positively driven relays
- Installation on DIN mounting rail

ESD3 variants

The ESD3 variants are distinguished firstly by their reset function and secondly by the configuration of the status relay contact. This can be implemented off-load both as open and closed. It is not a safety contact, but is exclusively used for transmitting information. It is not monitored for failure and must never be used for safety shutdown in any form whatsoever. Different voltage supply variants are available depending on the type:

| Version | Inputs | Safety relay | Reset | | Status relay | | | Voltage variants | | | |
|---------|--------|--------------|-------|--------------|--------------|----------|---|------------------|---|---------|---------|
| | | | 2 | Disconnected | Auto. | External | M | SM | D | 230 VAC | 115 VAC |
| 03 | x | x | x | | | x | | | x | | x |
| 04 | x | x | x | | x | | | x | x | | x |
| 05 | x | x | | x | | x | | | | | x |
| 06 | x | x | | x | x | | | | | | x |
| 08 | x | x | x | | | | x | | | | x |
| 09 | x | x | | x | | | x | | | | x |

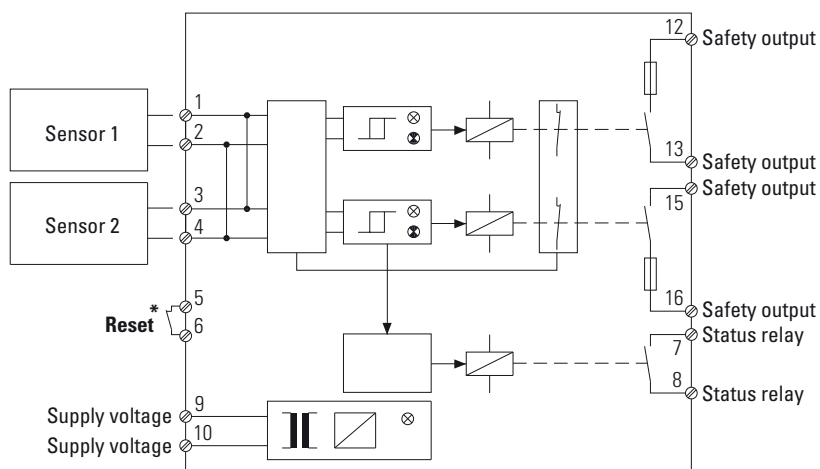
Status relay function

| Contacts | Type | De-energised | Sensor not actuated | Sensor actuated (LED yellow) | Fault (LED red) |
|-----------------------|-------------|--------------|---------------------|------------------------------|-----------------|
| Safety contacts | all types | 0 | X | 0 | 0 |
| Fault contact, SM | ESD3-03,-05 | 0 | X | X | 0 |
| Signalling contact, M | ESD3-04,-06 | 0 | X | 0 | 0 |
| Signalling contact, D | ESD3-08,-09 | X | 0 | X | X |

Key:
 0 = contact open
 X = contact closed

Switching devices

Block diagram and terminal assignment

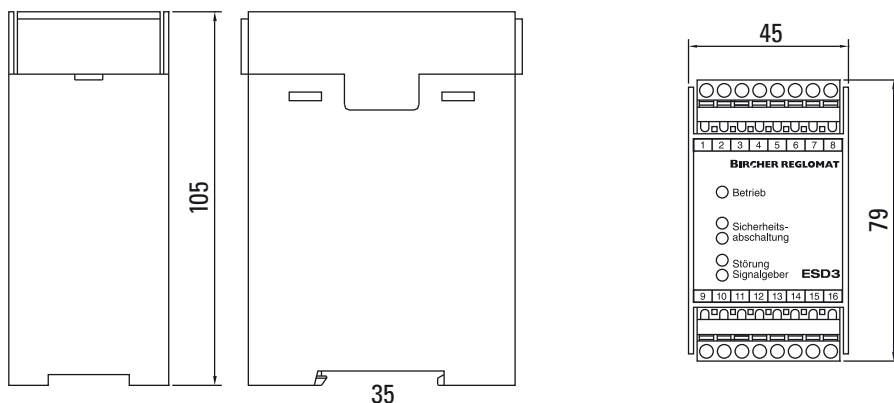


* Versions with automatic reset have this function integrated in the circuit

Terminals

- Type: 2 x 8-pin, pluggable
- 2 parallel sensor inputs

Dimensional drawing



Stick-on labels in the following languages: en, fr, it, es, sv



Technical data

| | |
|---|--|
| Power consumption | Max. 5 VA |
| Safety outputs | |
| Usage category in acc. with EN 60947-4-1 | AC- 1: 250 V/2 A/500 VA approx. 300'000 cycles DC-1: 24 V/2 A/48 W approx. 700'000 cycles |
| Usage category in acc. with EN 60947-5-1 | AC- 15: 250 V/2 A /500 VA approx. 130'000 cycles DC-13: 24 V/2 A/48 W approx. 70'000 cycles |
| Internal contact fuse | 2 A slow blowing |
| Mechanical service life | 20 million cycles |
| Status relay | |
| Switching capacity | 24 VDC / 1 A, resistive load; 30 VAC / 1 A, resistive load |
| Response time | < 50 ms |

For further technical data, please see last page

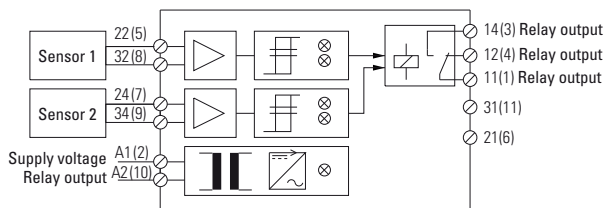
Switching devices



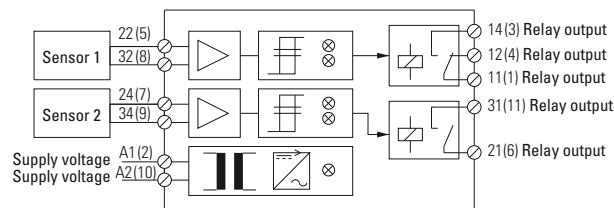
ESR 11 / ESR 12

- Bircher M3 housing, noryl red
- 11-pin connector
- Performance level c, cat. 1 acc. to EN ISO 13849-1
- Two-channel set-up
- Simple signal evaluation (for ESR 12 per channel)
- Detection of sensor faults

ESR 11 block diagram



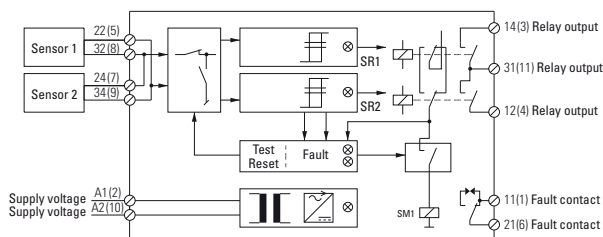
ESR 12 block diagram



ESR 31C / ESR 32

- Bircher M3 housing, noryl red
- 11-pin connector
- Performance level e, cat. 3 acc. to EN ISO 13849-1
- Double redundant signal evaluation
- Self-monitoring
- Start-up test
- Automatic or external reset

ESR 31C / ESR 32 block diagram



*Reset button on ESR 31C:
Green power LED is also the reset button

Specific technical data

| | |
|---|--|
| Power consumption | Max. 3 VA for ESR 11 / ESR 12; max. 5 VA for ESR 31C / ESR 32 |
| Signal output relay | AC- 1: 250 V/2 A/500 VA approx. 300'000 cycles DC-1: 24 V/2 A/48 W approx. 700'000 cycles |
| Usage category in acc. with EN 60947-4-1 | |
| Usage category in acc. with EN 60947-5-1 | AC- 1: 250 V/2 A/500 VA approx. 300'000 cycles DC-1: 24 V/2 A/48 W approx. 700'000 cycles |
| External contact fuse | 5 A sluggish for ESR 11 / ESR 12; 2 A sluggish for ESR 31C / ESR 32 |
| Mechanical service life | 20 million cycles |
| Response time | < 70 ms |
| Status relay for ESR 31C / ESR 32 | 30 VDC / 1A Ohmic load 1 A ind. load 30 VAC / 1A Ohmic load 0.5 A ind. load |

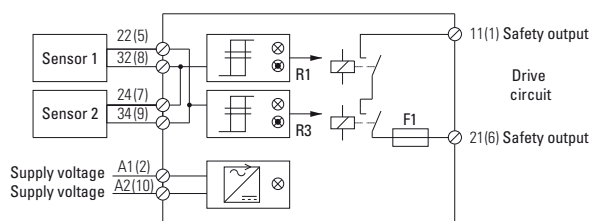
Switching devices



ESR 25 / ESR 26

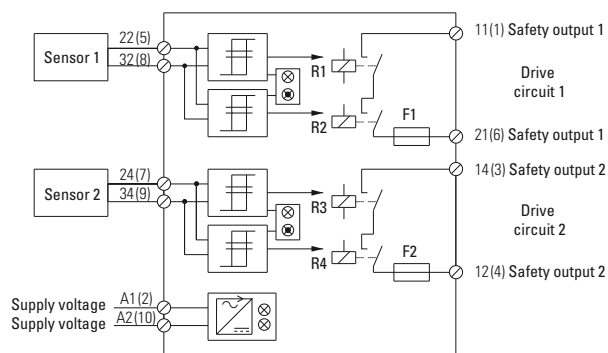
- Bircher M3 housing, noryl red
- 11-pin connector
- Performance level d, cat. 2 acc. to EN ISO 13849-1

ESR 25 block diagram



- Two parallel sensor inputs
- One safety output
- Redundant evaluation of sensor

ESR 26 block diagram

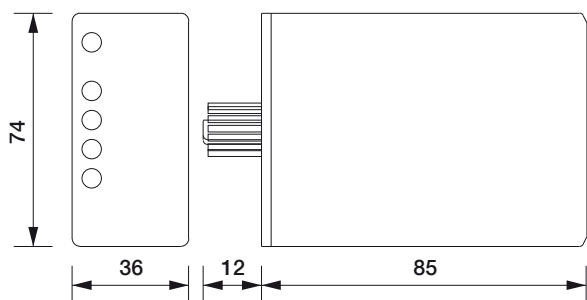


- Two separate sensor inputs
- Two separate sensor outputs
- Redundant evaluation of both channels

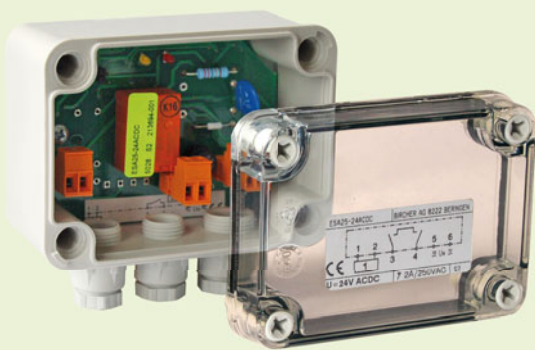
Specific technical data

| | |
|---|---|
| Power consumption | Max. 3 VA |
| Signal output relay | AC-1: 250 V / 2 A / 500 VA approx. 500'000 cycles |
| Usage category in acc. with EN 60947-4-1 | |
| External contact fuse | 2 A slow blowing |
| Mechanical service life | 20 million cycles |
| Response time | < 12 ms |

Dimensional drawing for ESR 11/12/25/26/31C/32



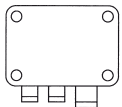
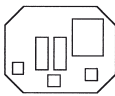
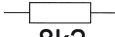

Switching devices



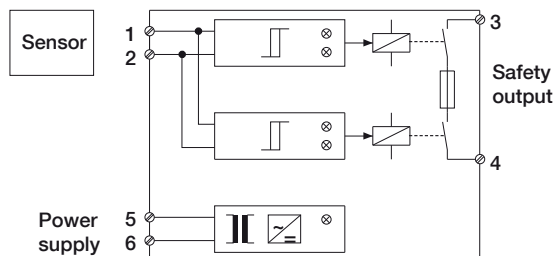
ESA 25 (A=panel mounting housing) / ESP 25 (P=Print)

- IP65 protection class (ESA 25)
- Panel mounting housing, ABS grey
- Redundant signal evaluation
- Performance level d, cat. 2 acc. to EN ISO 13849-1

ESA/ESP overview

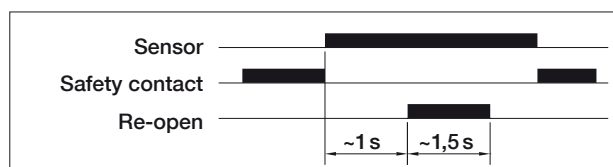
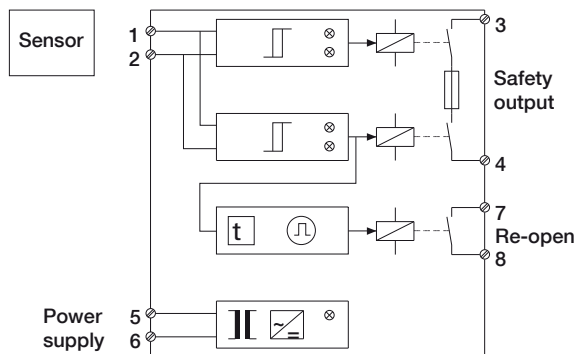
| |  |  |  |  |
|---------|---|--|---|---|
| ESA 25 | X | | X | |
| ESAS 25 | X | | X | X |
| ESP 25 | | X | X | |

ESA 25 / ESP 25 block diagram



- Redundant evaluation of both channels
- In output, both contacts are switched in series and protected by a fuse

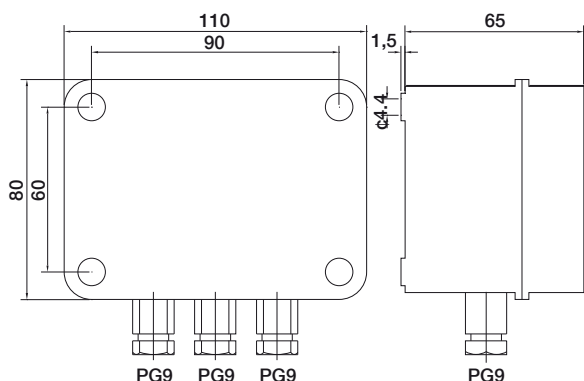
ESAS 25 block diagram



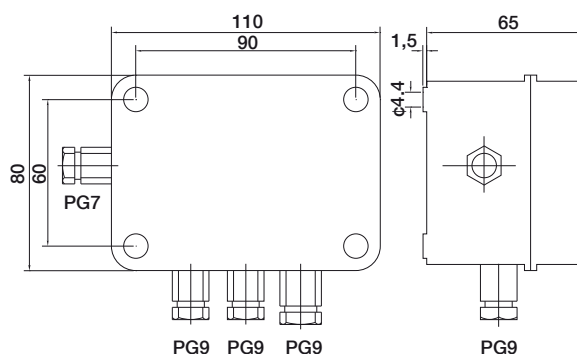
- Basic function as in ESA 25 / ESP 25
- in addition, when sensor is actuated for 1 second, the contact in the third relay closes for 1.5 seconds (re-start)

Switching devices

Dimensional drawing of panel mounting housing ESA 25









Dimensional drawing of panel mounting housing ESAS 25



Specific technical data

| | |
|---|---|
| Power consumption | Max. 4 VA |
| Signal output relay Usage category in acc. with EN 60947-4-1 | AC-1: 250 V / 2 A / 500 VA approx. 300'000 cycles DC-1: 24 V / 2 A / 48 W approx. 700'000 cycles |
| Internal contact fuse | 2 A slow blowing |
| Mechanical service life | 20 million cycles |
| Response time / drop-out time if circuit is interrupted | < 15 ms |
| Cable gland | For ESA 25: 4 x PG9 / for ESAS 25: 4 x PG9, 1 x PG7 |
| Sensor input | |
| Input resistance | 5 kOhm at 12 V (internal) |
| Input voltage at 8.2 kOhm | Approx. 7.5 VDC |
| Relay for re-start function (only ESAS) | |
| Switching capacity | 2 A / 250 VAC |
| Time delay | 1...1.5 sec. |
| Pulse duration | 1.5...2 sec. |

Ordering information

| Article no. | Description | |
|---------------|--------------------------|---|
| 210978 | ESD3-03-230VAC |  |
| 210979 | ESD3-03-24VACDC | |
| 210984 | ESD3-04-230VAC | |
| 210983 | ESD3-04-115VAC | |
| 210985 | ESD3-04-24VACDC | |
| 210988 | ESD3-05-24VACDC | |
| 210994 | ESD3-06-24VACDC | |
| 210997 | ESD3-08-24VACDC | |
| 211000 | ESD3-09-24VACDC | |
| 263911 | EsGate 2 24VACDC | |
| 263912 | EsGate 2.LVAC 100-240VAC | |
| 263913 | EsGate 3 24VACDC | |
| 263914 | EsGate 3.LVAC 100-240VAC | |
| 211897 | ESR31C-24VDC |  |
| 211922 | ESR32-24VDC | |
| 211903 | ESR32-115VAC | |
| 211909 | ESR32-230VAC | |
| 210865 | ESA25-24VACDC |  |
| 210864 | ESA25-230VAC | |
| 210884 | ESAS25-230AC | |
| 211731 | ESP25-24VACDC | |
| 211838 | ESR25-24VACDC |  |
| 211845 | ESR26-24VACDC | |
| 211777 | ESR11-24VACDC |  |
| 211771 | ESR11-230VAC | |
| 211795 | ESR12-24VACDC | |
| 211789 | ESR12-230VAC | |
| 209745 | 11-pin plug-in base |  |

Supplementary products

ClickLine

Electrical safety edge
rubber profiles with click-fit foot



CoverLine

Electrical safety edge
rubber profiles for clicking in at the side



RFGate 2.1 / RFGate 2.2.A

Wireless signal transmission system for safety edges on roller and sectional gates, folding doors, sliding gates at site entrance and telescopic gates



Safety mats

Electric pushbutton for activating and deactivating machines and devices



Technical data

General mechanical data

Weight approx. 250 g (depending on type)

General electrical data

Frequency range 50–60 Hz

Duty cycle 100% operating factor

Displays

Operation Green

Safety shutdown Yellow

Fault (interruption) Red

Ambient conditions

Protection class

Switching device IP30, except for ESA25

Operating temperature –20 °C to +50 °C

Storage temperature –40 °C to +80 °C

Air humidity Max. 80% relative
(no moisture condensation allowed)

Standards

Approvals EN ISO 13849-1

Note

Technical details and recommendations concerning our products are based on experience and are an aid for the orientation of the user. Details stated in our brochures and data sheets do not guarantee special properties of the products. This does not apply to special product properties confirmed by us in writing or individually. Subject to technical alterations.

BBC Bircher Smart Access

Wiesengasse 20

8222 Beringen

Switzerland

Phone +41 52 687 11 11

info@bircher.com

www.bircher.com