

## 1 Safety Instructions



- The assembly, commissioning, modifications and extensions may only be completed by an experienced electrician!
- Before commencing work remove the power supply from the units/installations!
- During the operation of electrical components
  - components are connected with dangerous voltages
  - e.g. in the case of a short circuit hot and ionised gases can be emitted
  - protection covers are not to be removed!
- Pay attention to all local relevant electrical safety regulations!
- Disregard of the safety regulations can cause death, severe injuries or extensive damage!
- Keep these operating instructions in a safe place for later use!

Before commencing the installation or assembly complete the following safety precautions:



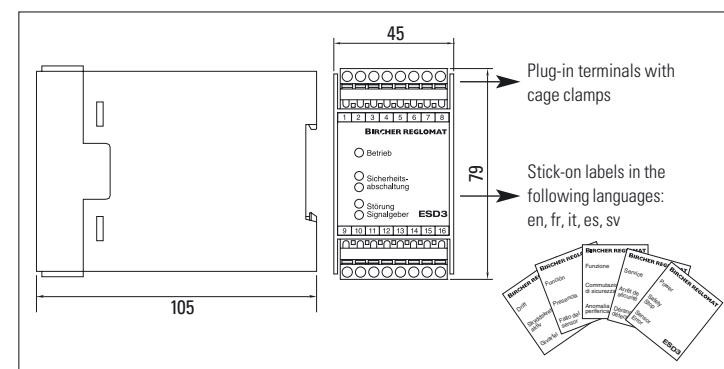
- Check the voltage data on the type plate of the switching unit.
- Remove the power supply from the units/installation!
- Ensure that the units/installations can not be switched on!
- Determine that the power supply is disconnected!
- Ground the phases and short circuit!
- Separate or cover neighbouring components which are connected to the power supply!
- Cover the unit during assembly!
- Foreign particles (e.g. borings from drilling) can damage the unit.
- Protect the unit with a housing against contamination or aggressive environments!

### Limited protection against accidental contact!

## 2 Product Description

ESD3 switching units are used for monitoring pressure sensitive protective devices from Bircher Reglomat AG (for contact mats acc. to EN 1760-1, for safety edges acc. to EN 1760-2). They meet the requirements of standard EN 954-1 for protective equipment up to safety category 3, if the drive is directly connected to the ESD3.

The ESD3 is fail-safe (single fault) and has two input channels with redundant evaluation. Each channel controls a positively driven relay. During each switching operation, the relays test themselves by means of contact feedback.



### 2.1 Configuration 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. Each type is available in three voltage supply variants: 24 V AC/DC, 115 V AC, 230 V AC.

| Type                              | Reset |          | Status relay         |                     |                 |                      |
|-----------------------------------|-------|----------|----------------------|---------------------|-----------------|----------------------|
|                                   | auto  | external | Signalling contact M | Fault contact SM    | Fault contact C | Signalling contact D |
| ESD3-03                           | X     |          |                      | X                   |                 |                      |
| ESD3-04                           | X     |          | X                    |                     |                 |                      |
| ESD3-05                           |       | X        |                      | X                   |                 |                      |
| ESD3-06                           |       | X        | X                    |                     |                 |                      |
| ESD3-08                           | X     |          |                      |                     |                 | X                    |
| ESD3-09                           |       | X        |                      |                     |                 | X                    |
| ESD3-03C                          | X     |          |                      |                     | X               |                      |
| ESD3-05C                          |       | X        |                      |                     | X               |                      |
| Status relay contact closed when: |       |          | Sensor not actuated  | Sensor not actuated |                 |                      |
|                                   |       |          |                      | Sensor actuated     |                 | Sensor actuated      |
|                                   |       |          |                      |                     | Fault           | Fault                |
|                                   |       |          |                      |                     | De-energised    | De-energised         |

## 2.2 Function

Connected sensors have a terminal resistance of 8.2 kOhm and are monitored for changes in the continuously flowing no-load current. In the non-activated condition all relays are energised.

When one or more sensors are **activated**

- the total resistance of the activated sensor system sinks towards zero ohm
- the value falls below the defined threshold
- the "safety" relay is de-energised
- the yellow LED's illuminate

When an **Error** occurs in the sensor circuit (cable breakage, sensor malfunction)

- the total resistance of the corresponding sensor system rises
- the defined switching limit is exceeded
- the "safety" relay is de-energised
- the red and yellow LED's illuminate

The **switching unit** is **reset** as follows

- by pressing an external reset button (ESD3-05/05C/06/09) → external reset,
- as soon as the sensor is no longer actuated (ESD3-03/03C/04/08) → auto reset,
- when the electrical power supply is interrupted.

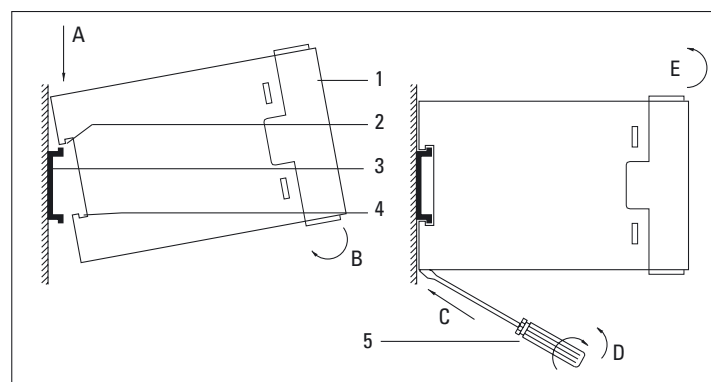
The recovery time is < 1 sec., then the green LED lights up.

## 3 Commissioning

- It is recommended that the resistance of the sensor is measured on the terminals 1 and 2 as well as 3 and 4. This should be between 7.5 and 9.0 kOhm with a non-activated sensor (typical 8.2 kOhm)
- Check that the power supply is in accordance with the value indicated on the type plate of the unit
- If one or more sensors are activated both yellow LED's "Safety Function" illuminate and both signal output relay de-energise. The sensors must now be activated at various positions whereby both yellow LED's must illuminate each time. The signal output relays remain de-energised
- Push the external reset button (ESD3-05/05C/06/09), minimum 1 second.
- If a terminal of the sensor input (e.g. 1) opened and the sensor connection is disconnected the sensor output relays will de-energise and the red LED's "System Error" illuminate. The fault indicator contact opens (respectively closes with ESD3...C)
- If the terminal is subsequently closed the fault condition remains until the external reset button is pressed (ESD3-05/05C/06/09), or the power supply is disconnected for a few seconds

## 4 Assembly and Removal

The switching unit is designed to be installed on a horizontally mounted mounting rail.



### Assembly

- Place the unit (1) at a slight angle with the guides (2) on the rail (3)
- (Rail 35 mm according to EN 50022)
- Push the unit (1) onto the rail (3) until the lock (4)

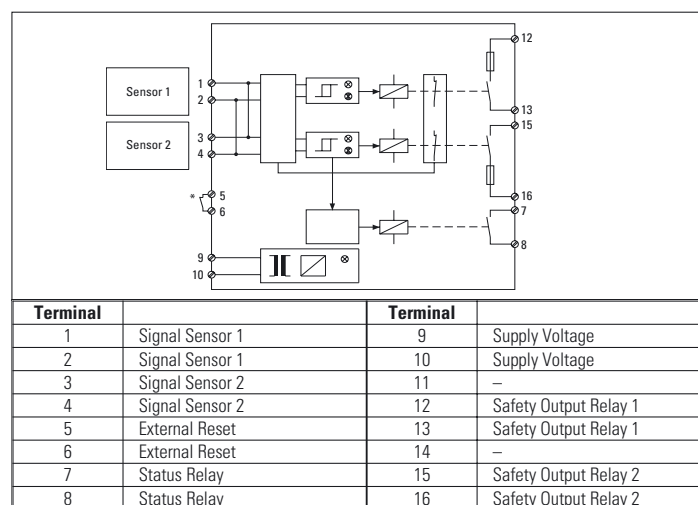
### Removal

- Place a screwdriver (5) on the red lock
- Unlock the unit by turning or levering the screwdriver
- Lift the unit and remove from the rail

## 5 Connection

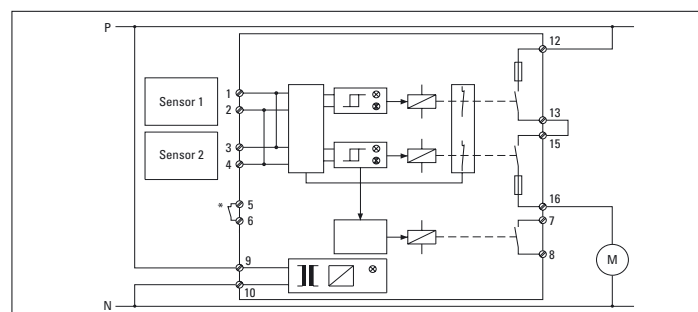
- The maximum length of the sensor with cable must not exceed 50 metres
- Maximum surface area 5 m<sup>2</sup>
- If multiple sensors are used, they have to be connected in series
- The last sensor equipped with resistor 8.2 kOhm
- If only one sensor input is used channel 2 must be jumpered (provided resistance 8.2 kOhm ±1%), otherwise a fault signal is generated

## 6 Block Diagram and Connection

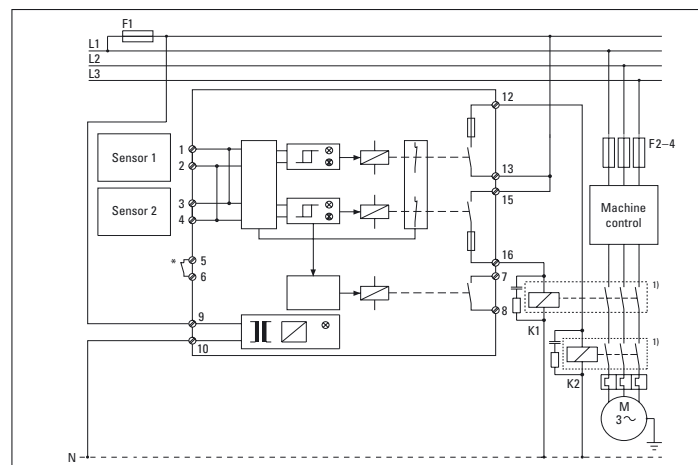


\*Versions with automatic reset have this function integrated in the circuit

## 7 Control of External Contactors



Wiring example for a one phase drive without control relay



Wiring example of a three-phase drive with control relay

<sup>1)</sup>Note: the contactors K1 and K2 must be designed in a way that welding of the contacts is recognized by K1 and K2 and does not lead into a loss of safety

## 8 Periodical Checks and Fault Finding

The correct functioning of the safety system must be checked periodically (monthly or according to overruling regulations). The sensor and wiring connections must also be checked for mechanical damage.

Proceed as follows if the function is not assured based on the wiring in the circuit diagram and both yellow or red LEDs light up at the same time:

- Press reset button (min. 1 sec.)
- Check all sensors to determine if activated or damaged
- Check sensor resistance on terminals 1/2 and 3/4 (8.2 kOhm)
- Repeat commissioning

There is a unit fault if both red LEDs continue to light up afterwards. → Return the unit for checking.

If only one yellow or red LED lights up → Return the unit for checking.

## 9 Technical data

|   |   |
|---|---|
| <b>Housing</b>  | DIN ABS, red/black                            |
| <b>Isolation Class</b>                                    | IP30 (IEC 529)                                |
| <b>Protection Class</b>                                   | IP54  |
| <b>Weight</b>   | max. 250 gramm (depending on type)            |
| <b>Power Supply acc. to EN60204-1 (depending on type)</b> | 24 VACDC ±10%<br>115 VAC ±10%<br>230 VAC ±10% |
| <b>Frequency Range</b>                                    | 50/60 Hz (45–66 Hz)                           |
| <b>Power consumption</b>                                  | max. 5 VA                                     |
| <b>Duty Cycle</b>   | 100%  |
| <b>Fastening</b>  | 35 mm mounting rail acc. to EN 50022          |

### Safety Output Relay

**Utilization category acc.to EN60947-4-1\*\***  
AC-1: 250 V/2 A/500 VA  
approx. 300'000 switchings  
DC-1: 24 V/2 A/48 W  
approx. 700'000 switchings

**Utilization category acc.to EN60947-5-1\*\* (DC13: 6 switchings/minute)**  
AC-15: 250 V/2 A/500 VA  
approx. 130'000 switchings  
DC-13: 24 V/2 A/48 W  
approx. 70'000 switchings

**Contacts** positively driven relays, AgCuNi  
**Operating Life** mechanical 50 million switchings

**Fuse Protection acc. to EN60947-5-1**  
2 A slow

### Status Relay

**Switching Capacity\*\***  
24VDC/1A, resistive load  
30VAC/1 A, resistive load

### Indicators

**Operation** Green  
**Error** Red (sensor resp. system error)  
**Safety Switch-off** Yellow (sensor)

### Reaction Time

**Safety Output Relay** < 50 ms

### Temperature Range

**Operation** -20°C to +55°C  
**Storage** -20°C to +80°C  
**Humidity** max. 80% relative (no condensation allowed)

**\*\*If not mentioned ratings are required, ask for them at the manufacturer**



For 24 VACDC supply voltage must be obtained from a safety trafo according to IEC742. The wiring must be protected against mechanical damage.

For further information on using an ESD3 switching unit as a safety system with contact mats or edges, please request the relevant information from one of our sales offices.

## 10 Warranty and Liability

- The warranty and liability of Bircher Reglomat AG are based on the sales contract.
- The warranty and liability shall expire prematurely, should the client or third parties not use and/or operate the product in compliance with existing operating instructions, should incorrect changes or repairs be made by the client or third parties, should the client or third parties, when a fault has occurred, not take suitable steps at once for a reduction of possible damage/losses and offer Bircher Reglomat AG a chance for remedying the said fault.
- The warranty and liability shall exclude any damage for which there is no proof that it is due to poor materials, faulty construction, poor workmanship, and any damage caused by other reasons, for which Bircher Reglomat AG cannot be held liable.
- No liability can be assumed for any consequential damage, provided this is not governed otherwise by applicable product liability laws and regulations.
- Warranty claims made against the seller on the basis of the sales agreement are not affected by these regulations.
- For the benefit of its customers Bircher Reglomat AG constantly develops its products further. Bircher Reglomat AG reserves the right to make changes to any of the products described in this document without prior notice.