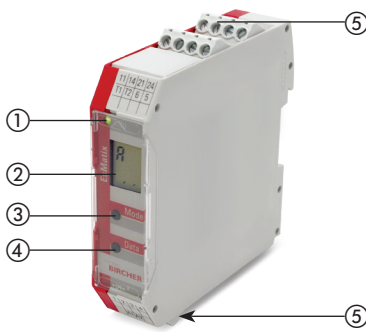# EsMatix 3
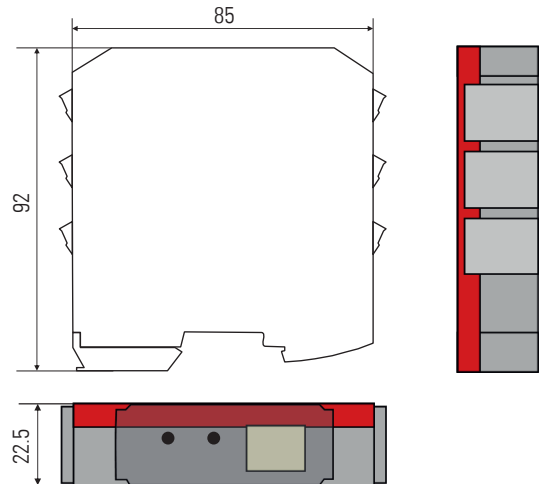
Safety switching device for sensors with 8,2 kΩ

Translation of the original instructions

General

① LED
② LCD display
③ "Mode" button
④ "Data" button
⑤ Connecting terminals

85

92

22.5

1 Safety Instructions

- Read these operating instructions thoroughly before putting the device into operation and keep them for future reference.
- Do not use this product other than for its specified application.
- Only trained and qualified personnel may install and initialize the device.
- Only authorized factory personnel may perform hardware/software changes or repairs to the product.
- Pay attention to all local relevant electrical safety regulations!
- Failure to follow these safety precautions may cause damage to device or objects, serious personal injury, or death.
- It is the responsibility of the equipment installer to carry out a risk assessment and to install the system, in compliance with applicable local, national and international regulations, safety standards, codes and laws as well as the Machinery Directive 2006/42/EC, should this apply.
- Observe all applicable local, national, and international door safety standards, codes, and laws.
- Always consider the safety functions of your applications as a whole, never just in relation to one individual section of the system.
- The installer is responsible for testing the system to ensure it meets all applicable safety standards.

- During the operation of electrical components
  – e. g. in the case of a short circuit hot and ionised gases can be emitted; protection covers must not be removed!
- The device should only be operated from a safety extra low voltage (SELV) system with safe electrical separation according to EN 61558.
- The wiring must be protected against mechanical damage.

Prior to starting installation or mounting, take the following safety precautions:
- Check the voltage data on the label of the switching device.
- Ensure that the device/installations cannot be switched on!
- Ensure that the power supply is disconnected!
- Protect the device with a housing against contamination or harsh environments!
- Cover any neighbouring live parts or remove them!
- Disconnect device from mains in the event of a fault.
- Avoid touching any electronic components.
- Limited protection against accidental contact!

2 Intended use

The EsMatix 3 switching devices are used to monitor pressure-sensitive pressure-sensitive protective devices of the manufacturer (for safety mats according to EN ISO 13856-1, for safety edges according to EN ISO 13856-2). They comply with the requirements of the standard EN ISO 13849-1 for protective devices up to PL e, Cat. 3.
If the safety device is not requested operationally at least once a month, it must be checked automatically or manually by the operator at least once a month.
The device can be installed in a simple, industrial or even controlled electromagnetic environment.

Common Applications

Control

EsMatix 3

EsMatix 3
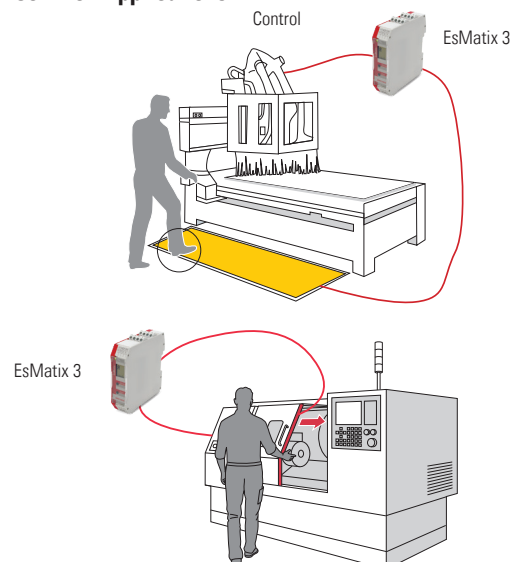
3 Function

Connected sensors with a terminating resistor of 8.2 kΩ are monitored for a change in current. In the idle mode
- all safety outputs are conductive
- the LED lights up green
- current reset-function appears on the display

When one or more sensors are **actuated**
- the total resistance of the sensor system drops to zero Ωs
- the defined switching threshold is not reached anymore
- **both** output relays "Safety" open
- the LED lights up orange, P appears on the display

In the event of a **fault** in the sensor circuit (for example cable breakage)
- the total resistance of the sensor system increases
- the defined switching threshold is exceeded
- **both** output relays "Safety" open
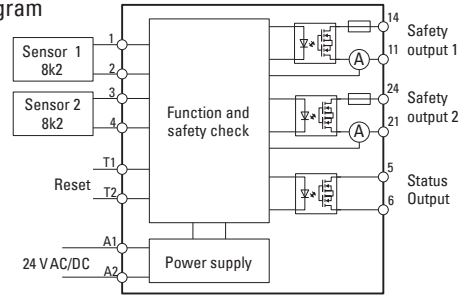- the LED lights up red, E appears on the display

Reset (Acknowledgment) of the switching device is carried out:
Depending on the configuration
- By pressing and releasing the "data" button
- Automatically
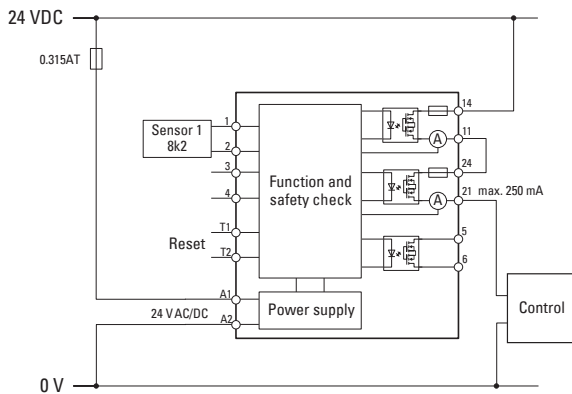- By applying and removing again an external reset signal to T1-T2

The recovery time after reset is < 30 ms (< 0.5 sec after a fault), then the LED lights green
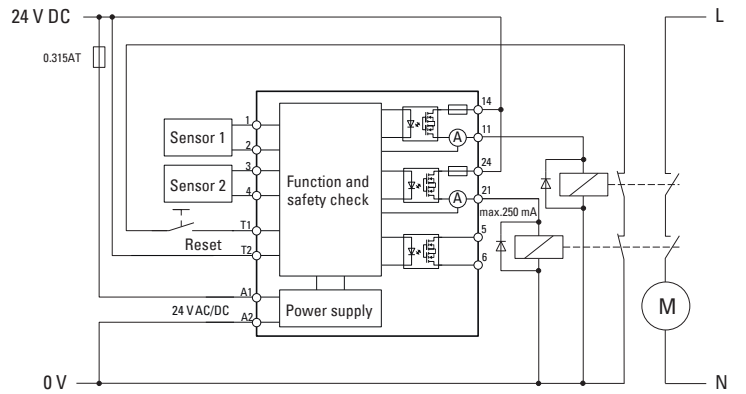
Block diagram

4 Connections, Settings

Examples: Wiring with autoreset

Wiring with external reset and EDM (external device monitoring)

ⓘ In operation with external relays, freewheeling diodes are mandatory.

5 Configuration and set-up

5.1 Terminals

Wiring the device

A1 / A2:	Supply voltage (24 VDC or 24 VAC) ▲
1 / 2:	Sensor 1
3 / 4:	Sensor 2
11 / 14:	Safety Relay 1 ▲
21 / 24:	Safety Relay 2 ▲
5 / 6:	Status output
T1 / T2:	Reset

ⓘ   No function test possible without connected outputs (Display E 007)
▲   Wiring mandatory

Switch on supply voltage
If necessary, configure the device

5.2 Function test

Function test
- Press sensor 1, check LED (orange), display (P, ①, ②, 1). Check if both outputs are open.
- Release sensor
- Manually reset device at reset type external (Et): close and reopen contact or at reset type internal (but): press and release button "Data"
- If present, press sensor 2, check LED, display (P, ①, ②, 2). Check if both outputs are open.
- Release sensor
- Manually reset device at reset type external (Et): close and reopen contact or at reset type internal (but): press and release button "Data"

After successful testing, the system is ready for operation.
Display: A and two flashing dots

5.3 Diagnostic menu (read only)

⌄ Data ❯ Mode ⌄⌄ Back to top ❯❯ Back to start

The menu flow (2 sec):

❯ E	❯ r	❯ C	❯ a	❯ L	❯ I	❯ h	❯ O	❯ d	❯ C	❯❯
Errors	Resistance	Configuration	Reset type	Reset logic	Reset input	Holding time	Status relay	Input delay	Configuration	
Error 5 latest	1 value	1 Sensor 1	Aut auto restart	LOA ⊔	Act active	no no	SC see table 1	no no	con	
Error 4	2 value								con (flashing)	
Error 3										
Error 2										
Error 1										
End										

Access Configuration

Exit Diagnostic menu:

2 sec ❯

E last 5 error messages (displayed by pressing button "Data")
r current resistances of the sensors (displayed in kΩ: 1, 2, 4, 6, 8, 10, 12 or 14)
C shows the current configuration (active inputs):
  1 = only input 1, 2 = both inputs 1 and 2
a the programmed reset function:
  Aut = auto restart, Et = external, but = internal (button «Data»)
L only if a = Et: Type of external reset signal:
  LOA = ⊔ (pulse low active), HIA = ⊓ (pulse high active)
I only if a = Et: status of the applied reset signal: Act = active,
  IdL = inactive
h only if a = Aut: The holding time (extension of the output signal):
  no = no, 0.1 = 100 ms, 0.2 = 200 ms, 0.5 = 500 ms, 1.0 = 1 s
O type of the status output: Signaling contact = SC,
  Fault contact = FC (see table 5.4)
d Input on delay: no = no, 15 = 15 ms, 30 = 30 ms, 45 = 45 ms
C configuration: entering into the configuration mode by pressing
  "data"→ Chap. 5.4

Enter Diagnostic menu:
Press "Mode" and "Data" buttons simultaneously for 2 seconds
→ Status LED flashes orange
To see the next parameter, press "Mode", Data query (Mode E and r):
press "Data"

Exit Diagnostic menu:
❯ Press "Mode" button for 2 seconds

5.4 Configuration mode (edit mode)

The menu flow (2 sec):

❯ C	❯ a	❯ L[1]	❯ h[2]	❯ O	❯ d	❯ ❯❯
Configuration	Reset	Reset Input	Holding time	Status relay	Input delay	
1* Sensor 1	Aut* auto restart	LOA* ⊔	no no	SC* see table 1	no* no	
2 Sensors 1+2	Et external	HIA ⊓	0.1 100 ms	FC see table 1	15 15 ms	
	but button «Data»		0.2* 200 ms		30 30 ms	
			0.5 500 ms		45 45 ms	
			1.0 1 s			

[1] "L" only at "a" = Et
[2] "h" only at "a" = Aut

* Factory settings

Exit Configuration menu:

2 sec ❯

On initial commissioning, the device must be adapted (configured) to the application.

Enter Configuration menu:
• Enter diagnostic menu: Press "Mode" and "Data" buttons simultaneously for 2 seconds.
• Press "Mode" repeatedly until "C" and "con" are displayed.
• Press "Data" button, "con" starts flashing.
• Press "Mode" and "Data" buttons simultaneously until "con" stops flashing. Green LED starts flashing fast.
• Release "Mode" and "Data", "C" starts flashing, both safety relays open.

Configuration
• Press the "Mode" button to select the requested parameter.
• Press the "Data" button to set the value.

Exit Configuration menu: Press "Mode" for 2 seconds.

Adjustable parameters:
C active inputs: 1 = only input 1, 2 = both inputs 1 and 2
a type of reset: Aut = auto restart, Et = external, but = internal (push button)
L only if a = Et: Type of external reset signal:
  LOA = ⊔ (pulse low active), HIA = ⊓ (pulse high active)
h only if a = Aut: The holding time (extension of the output signal):
  no = no, 0.1 = 100 ms, 0.2 = 200 ms, 0.5 = 500 ms, 1.0 = 1 s
O Status output: Signaling contact = SC,
  Fault contact = FC → see table 1
d Input on delay: no = no, 15 = 15 ms, 30 = 30 ms, 45 = 45 ms

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Table 1: Status output

Contacts	Type	Unpowered (LED off)	Sensor idle (LED green)	Sensor actuated (LED orange)	Fault (LED red)
FC (Fault contact)	EsMatix 3	OPEN	closed	closed	OPEN
SC (Signaling contact)	EsMatix 3	OPEN	closed	OPEN	OPEN
Safety contacts	all types	OPEN	closed	OPEN	OPEN

5.5 Service mode

☑ Data ▶ Mode ☒ Back to top ⏩ Back to start

10 sec	**H** Hardware version	**S** Software version	**t** Type	**U** Supply voltage	**o** Chip temperature	**E** Errors flash	**E** Errors flash
	005	6.52	3	value	value	Error 5 latest	rES
						Error 4	---
						Error 3	
						Error 2	
						Error 1	
						End	

Enter Service mode: Press "Data" for 10 seconds
→ Green status LED flashes
To enter the next mode, press "Mode"
Data query in each mode: press "Data" button
Exit Service mode: Press "Mode" button for 2 seconds

In the service mode, further information can be queried:
H Hardware Version
S Software Version
t Type (Cat. acc. to EN ISO 13849-1)
U Internal supply voltage
o Current chip temperature
E The last five error messages (displayed by pressing "Data" button)
E rES: press and hold "Data" button until --- is displayed to reset the memory of the error messages

5.6 Error displays

If an error is detected both relays are deactivated and symbols ① & ② and an error code are displayed. The status LED lights up red.

Display	E001	E002	E006	E007	E008	E009	E101	E102
Error	Sensor 1 wiring defective	Sensor 2 wiring defective	Configuration mode incorrectly set	① Outputs not OK	②	① ②	Under-voltage	Overvoltage
Remedy	Check sensor 1	Check sensor 2	Check configuration	Check connection for outputs			Check supply	

Should other fault messages appear, please contact your supplier.

6 Technical Data

Supply voltage	24 V AC −20% to +10%, 50/60 Hz 24 V DC −20% to +20%
Power consumption	max. 3 W
Inputs Sensors	for Sensors with 8,2 kΩ termination
Input Reset	24 V AC/DC, max. 3 mA@24 V U_{th} > 8 V DC
Safety relays	Solid state relays, 24 V DC, min. 0,5 mA, max. 250 mA, $R_{DS(on)}$ ca. 2 Ω, internally protected by a 300 mA fuse
Status output	Solid state relays, 24 V AC/DC, max. 250 mA, $R_{DS(on)}$ ca. 2 Ω
Reaction time (at activation)	< 5 ms

Recovery time	< 30 ms (reset after activation)
Start-up time	< 300 ms
External reset pulse (required)	> 100 ms
Housing	Polyamide grey / red
Dimensions	22,5 × 92 × 85 mm (W x H x D)
Mounting	Direct DIN-rail mounting
Terminals	Pluggable screw terminals
Protection class	IP20
Operating temperature	−20°C to +60°C
Storage temperature	−40°C to +70°C
Humidity	Max. 95% relative, non-condensing

7 EU Declaration of Conformity

CE See attachment

8 WEEE

Devices with this symbol must be treated separately during disposal. This must be done in accordance with the laws of the respective countries for environmentally sound disposal, processing and recycling of electrical and electronic equipment.

8 Contact

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