



Non-Contact Safety Switches

CES-AZ-AES... CES-AZ-UES...

More than safety.



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Non-Contact Safety Switches CES-AZ-AES...

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Evaluation Unit CES-AZ-AES-01B

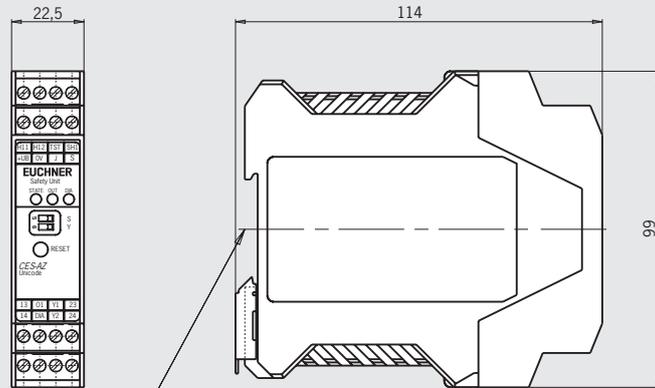
- ▶ 1 read head can be connected
- ▶ 2 safety contacts (relay contacts)
- ▶ 2 internal NO contacts per safety contact
- ▶ Plug-in connection terminals
- ▶ Start button and feedback loop can be connected
- ▶ Reset button
- ▶ Category 4 according to EN 13849-1

Evaluation unit CES-AZ-AES-01B

Cat.
4

1

Dimension drawing



Suitable for 35 mm DIN rail according to DIN EN 50022-35

For possible combinations see page 8

Unicode evaluation unit

Each actuator is unique. The evaluation unit detects only the actuator that has been taught-in. Additional actuators can be taught-in. Only the last actuator taught-in is detected. New actuators are taught-in by fitting a jumper.

Multicode evaluation unit

Every actuator is detected by the evaluation unit.

Guard lock monitoring

Evaluation units in the series CES-AZ make it possible to use read heads with integrated guard locking for the personal protection during overtravelling machine movements. For suitable read heads, please refer to the combinations table on p. 8.

Category according to EN 13849-1

Due to two redundant safety contacts (relay contacts) with 2 internal, monitored NO contacts per safety contact, suitable for:

- ▶ Category 4 according to EN 13849-1

Each safety contact is independently safe.

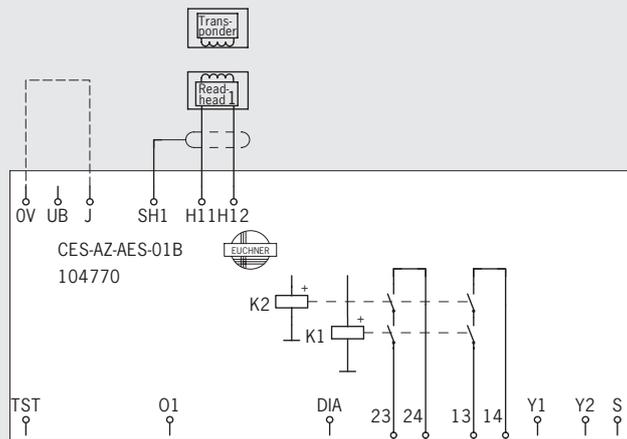
Operating distance

The evaluation unit has the standard operating distance that, e. g., permits larger tolerances in the alignment of read head and actuator.

Additional connections

- TST** Input for self-test
- O1** Monitoring output (semiconductor)
- DIA** Diagnostic output
- Y1, Y2** Feedback loop
- S** Start button connection

Block diagram



Important: The plug-in connection terminals are not included and must be ordered separately.

Ordering table

Series	Category according to EN 13849-1	Operating distance	Number of read heads	Version	Order No. / Item
CES-AZ-AES-01B Unicode	4	Standard	1		104 770 CES-AZ-AES-01B
CES-AZ-UES-01B Multicode	4	Standard	1		105 139 CES-AZ-UES-01B
Connection kit for evaluation unit CES-AZ-ES-01B				Plug-in screw terminals	104 756 CES-EA-TC-AK04-104756

1) BG approval pending



Non-Contact Safety Switches CES-AZ-AES...

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Technical Data Evaluation Unit CES-AZ-AES-01B

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Plastic PA6.6			
Dimensions	114 x 99 x 22.5			mm
Weight	0.2			kg
Ambient temperature at $U_B = DC 24 V$	-20	-	+55	°C
Atmospheric humidity, not condensing	-	-	80	%
Degree of protection acc. to EN 60529	IP20			
Degree of contamination / material group	2 / IIIa			
Installation	DIN rail 35 mm according to EN 50022-35			
Number of read heads	1 read head per evaluation unit			
Connection (plug-in screw terminals/coded)	0.14	-	2.5	mm ²
Operating voltage U_B (regulated, residual ripple < 5 %)	21	24	27	V DC
For the approval according to  the following applies	Operation with UL-class 2 power supply only			
Current consumption I_B (with relay energized) ¹⁾	-	150	-	mA
External fuse (operating voltage U_B)	0.25	-	8	A
Safety contacts	2 (relays with internally monitored contacts)			
Switching current (relay outputs)				
- At switching voltage AC/DC 21 ... 60 V	1	-	300	mA
- At switching voltage AC/DC 5 ... 30 V	10	-	6000	
- At switching voltage AC 5 ... 230 V	10	-	2000	
Switching load according to 	Max. AC 30 V, class 2 / max. DC 60 V, class 2			
External fusing (safety circuit) according to EN 60269-1	6 AgG or 6 A circuit breaker (characteristic B or C)			
Utilization category according to EN 60947-5-1	AC-12 60V 0.3A / DC-12 60V 0.3A AC-12 30V 6A / DC-12 30V 6A AC-15 230V 2A / DC-13 24V 3A			
Category according to EN 13849-1	4			
Classification acc. to EN 60947-5-3	PDF-M			
Rated insulation voltage U_i	250			V
Rated impulse withstand voltage U_{imp}	4			kV
Rated conditional short-circuit current	100			A
Resilience to vibration	As per EN 60947-5-2			
Mechanical operating cycles (relays)	10 x 10 ⁶			
Switching delay from state change ²⁾	-	-	210	ms
Time difference (between the switching points of the two relays)	-	-	25	ms
Current via feedback loop Y1/Y2	5	8	10	mA
Permissible resistance via feedback loop	-	-	600	Ω
Ready delay ³⁾	-	10	12	s
Dwell time ⁴⁾	3	-	-	s
Switching frequency max. ⁵⁾	-	-	0.25	Hz
Monitoring outputs (diagnostics DIA, door monitoring output O1, semiconductor output, p-switching, short circuit-protected)				
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	20	mA
Start button input S, test input TST				
- Input voltage LOW	0	-	2	V DC
- Input voltage HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
EMC protection requirements	As per EN 60947-5-3			

1) Without taking into account the load currents on the monitoring outputs.

2) Corresponds to the risk time according to EN 60947-5-3. This is the maximum switch-off delay for the safety outputs following removal of the actuator. In case of EMC interference in excess of the requirements in accordance with EN 60947-5-3, the switch-off delay can increase to max. 250 ms. After a brief actuation < 0.25 s, the switch-on delay can increase to max. 3 s if this is followed immediately by further actuation.

3) After the operating voltage is switched on, the relay outputs are switched off and the monitoring outputs are set LOW during the ready delay. For the visual indication of the delay, the green STATE LED flashes at a frequency of approx. 15 Hz.

4) The dwell time is the time that the actuator must be inside or outside the operating distance.

5) If the current load is > 100 mA, a switching frequency of 0.1 Hz should not be exceeded as this will affect the mechanical life of the relay contacts.

Non-Contact Safety Switches CES-AZ-AES...

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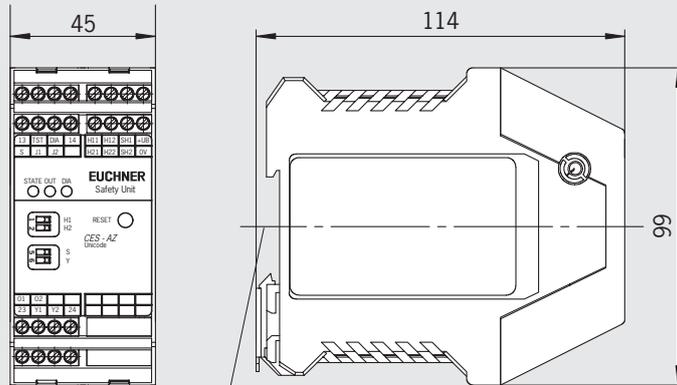
Evaluation Unit CES-AZ-AES-02B

- ▶ 2 read heads can be connected
- ▶ 2 safety contacts (relay contacts)
- ▶ 2 internal NO contacts per safety contact
- ▶ Plug-in connection terminals
- ▶ Start button and feedback loop can be connected
- ▶ Reset button
- ▶ Category 4 according to EN 13849-1

Evaluation unit CES-AZ-AES-02B

Cat. 4	2
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Dimension drawing



Suitable for 35 mm DIN rail according to DIN EN 50022-35

For possible combinations see page 8

Unicode evaluation unit

Each actuator is unique. The evaluation unit detects only the actuator that has been taught-in. Additional actuators can be taught-in. Only the last actuator taught-in is detected. New actuators are taught-in by fitting a jumper.

Multicode evaluation unit

Every actuator is detected by the evaluation unit.

Guard lock monitoring

Evaluation units in the series CES-AZ make it possible to use read heads with integrated guard locking for the personal protection during overtravelling machine movements. For suitable read heads, please refer to the combinations table on p. 8.

Category according to EN 13849-1

Due to two redundant safety contacts (relay contacts) with 2 internal, monitored NO contacts per safety contact, suitable for:

- ▶ Category 4 according to EN 13849-1
- Each safety contact is independently safe.

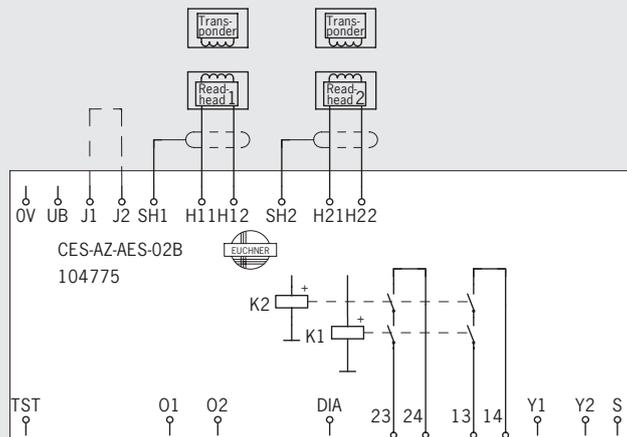
Operating distance

The evaluation unit has the standard operating distance that, e. g., permits larger tolerances in the alignment of read head and actuator.

Additional connections

- TST** Input for self-test
- O1, O2** Monitoring outputs (semiconductor)
- DIA** Diagnostic output
- Y1, Y2** Feedback loop
- S** Start button connection

Block diagram



Important: The plug-in connection terminals are not included and must be ordered separately.

Ordering table

Series	Category according to EN 13849-1	Operating distance	Number of read heads	Version	Order No. / Item
CES-AZ-AES-02B Unicode	4	Standard	2		104 775 CES-AZ-AES-02B
CES-AZ-UES-02B Multicode	4	Standard	2		105 140 CES-AZ-UES-02B
Connection kit for evaluation unit CES-AZ-.ES-02B				Plug-in screw terminals	104 771 CES-EA-TC-AK06-104771

1) BG approval pending



Non-Contact Safety Switches CES-AZ-AES...

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Technical Data Evaluation Unit CES-AZ-AES-02B

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Plastic PA6.6			
Dimensions	114 x 99 x 45			mm
Weight	0.25			kg
Ambient temperature at $U_B = DC 24 V$	-20	-	+55	°C
Atmospheric humidity, not condensing	-	-	80	%
Degree of protection acc. to EN 60529	IP20			
Degree of contamination / material group	2 / IIIa			
Installation	DIN rail 35 mm according to EN 50022-35			
Number of read heads	Max. 2 read heads per evaluation unit			
Connection (plug-in screw terminals/coded)	0.14	-	2.5	mm ²
Operating voltage U_B (regulated, residual ripple < 5 %)	21	24	27	V DC
For the approval according to  the following applies	Operation with UL-class 2 power supply only			
Current consumption I_B (with relay energized) ¹⁾	-	150	-	mA
External fuse (operating voltage U_B)	0.4	-	8	A
Safety contacts	2 (relays with internally monitored contacts)			
Switching current (relay outputs)				
- At switching voltage AC/DC 21 ... 60 V	1	-	300	mA
- At switching voltage AC/DC 5 ... 30 V	10	-	6000	
- At switching voltage AC 5 ... 230 V	10	-	2000	
Switching load according to 	Max. AC 30 V, class 2 / max. DC 60 V, class 2			
External fusing (safety circuit) according to EN 60269-1	6 A gG or 6 A circuit breaker (characteristic B or C)			
Utilization category according to EN 60947-5-1	AC-12 60V 0.3A / DC-12 60V 0.3A AC-12 30V 6A / DC-12 30V 6A AC-15 230V 2A / DC-13 24V 3A			
Category according to EN 13849-1	4			
Classification acc. to EN 60947-5-3	PDF-M			
Rated insulation voltage U_i	250			V
Rated impulse withstand voltage U_{imp}	4			kV
Rated conditional short-circuit current	100			A
Resilience to vibration	As per EN 60947-5-2			
Mechanical operating cycles (relays)	10 x 10 ⁶			
Switching delay from state change ²⁾				
- 2 activated actuators	-	-	290	ms
- 1 activated actuator	-	-	210	
Time difference between the switching points of the two relays (with 2 activated actuators)	-	-	25	ms
Manual start operating mode				
- Duration of operation of start button	250	-	-	ms
- Start button response delay	-	200	300	
Current via feedback loop Y1/Y2	5	8	10	mA
Permissible resistance via feedback loop	-	-	600	Ω
Ready delay ³⁾	-	10	12	s
Dwell time ⁴⁾	3	-	-	s
Switching frequency max. ⁵⁾	-	-	0.25	Hz
Monitoring outputs (diagnostics DIA, door monitoring output 01...02, semiconductor output, p-switching, short circuit-protected)				
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	20	mA
Start button input S, test input TST				
- Input voltage LOW	0	-	2	V DC
- Input voltage HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
EMC protection requirements	As per EN 60947-5-3			

1) Without taking into account the load currents on the monitoring outputs.

2) Corresponds to the risk time according to EN 60947-5-3. This is the maximum switch-off delay for the safety outputs following removal of the actuator. In case of EMC interference in excess of the requirements in accordance with EN 60947-5-3, the switch-off delay can increase to max. 430 ms. After a brief actuation < 0.4 s, the switch-on delay can increase to max. 3 s if this is followed immediately by further actuation.

3) After the operating voltage is switched on, the relay outputs are switched off and the monitoring outputs are set LOW during the ready delay. For the visual indication of the delay, the green STATE LED flashes at a frequency of approx. 15 Hz.

4) The dwell time is the time that the actuator must be inside or outside the operating distance.

5) In the case of monitoring with feedback loop, the actuators must remain outside the operating distance, e.g. with a door open, until the feedback circuit is closed.

Non-Contact Safety Switches CES-AZ-AES...

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Evaluation Unit CES-AZ-AES-04B

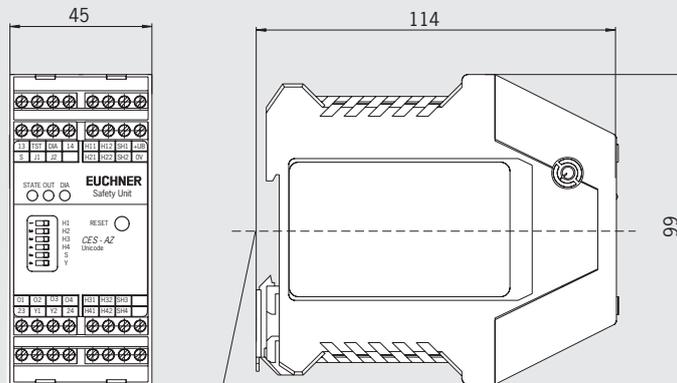


- ▶ 4 read heads can be connected
- ▶ 2 safety contacts (relay contacts)
- ▶ 2 internal NO contacts per safety contact
- ▶ Plug-in connection terminals
- ▶ Start button and feedback loop can be connected
- ▶ Reset button
- ▶ Category 4 according to EN 13849-1

Evaluation unit CES-AZ-AES-04B



Dimension drawing



Suitable for 35 mm DIN rail according to DIN EN 50022-35

For possible combinations see page 8

Unicode evaluation unit

Each actuator is unique. The evaluation unit detects only the actuator that has been taught-in. Additional actuators can be taught-in. Only the last actuator taught-in is detected. New actuators are taught-in by fitting a jumper.

Multicode evaluation unit

Every actuator is detected by the evaluation unit.

Guard lock monitoring

Evaluation units in the series CES-AZ make it possible to use read heads with integrated guard locking for the personal protection during overtravelling machine movements. For suitable read heads, please refer to the combinations table on p. 8.

Category according to EN 13849-1

Due to two redundant safety contacts (relay contacts) with 2 internal, monitored NO contacts per safety contact, suitable for:

- ▶ Category 4 according to EN 13849-1

Each safety contact is independently safe.

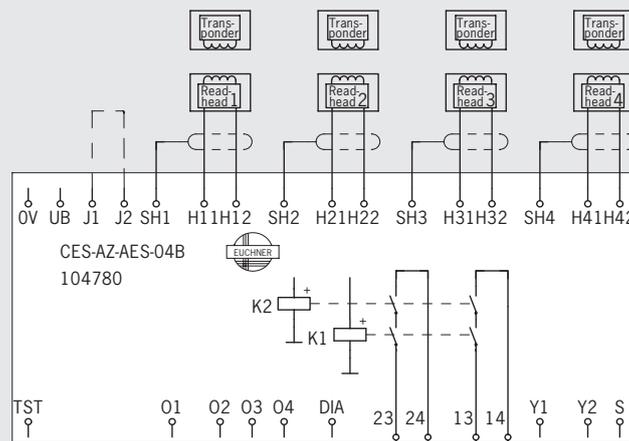
Operating distance

The evaluation unit has the standard operating distance that, e. g., permits larger tolerances in the alignment of read head and actuator.

Additional connections

- TST** Input for self-test
- 01 ... 04** Monitoring outputs (semiconductor)
- DIA** Diagnostic output
- Y1, Y2** Feedback loop
- S** Start button connection

Block diagram



Important: The plug-in connection terminals are not included and must be ordered separately.

Ordering table

Series	Category according to EN 13849-1	Operating distance	Number of read heads	Version	Order No. / Item
CES-AZ-AES-04B Unicode	4	Standard	4		104 780 CES-AZ-AES-04B
CES-AZ-UES-04B Multicode	4	Standard	4		105 141 CES-AZ-UES-04B
Connection kit for evaluation unit CES-AZ-ES-04B				Plug-in screw terminals	104 776 CES-EA-TC-AK08-104776

1) BG approval pending



Non-Contact Safety Switches CES-AZ-AES...

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Technical Data Evaluation Unit CES-AZ-AES-04B

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Plastic PA6.6			
Dimensions	114 x 99 x 45			mm
Weight	0.25			kg
Ambient temperature at $U_B = DC 24 V$	-20	-	+55	°C
Atmospheric humidity, not condensing	-	-	80	%
Degree of protection acc. to EN 60529	IP20			
Degree of contamination / material group	2 / IIIa			
Installation	DIN rail 35 mm according to EN 50022-35			
Number of read heads	Max. 4 read heads per evaluation unit			
Connection (plug-in screw terminals/coded)	0.14	-	2.5	mm ²
Operating voltage U_B (regulated, residual ripple < 5 %)	21	24	27	V DC
For the approval according to  the following applies	Operation with UL-class 2 power supply only			
Current consumption I_B (with relay energized) ¹⁾	-	150	-	mA
External fuse (operating voltage U_B)	0.4	-	8	A
Safety contacts	2 (relays with internally monitored contacts)			
Switching current (relay outputs)				
- At switching voltage AC/DC 21 ... 60 V	1	-	300	mA
- At switching voltage AC/DC 5 ... 30 V	10	-	6000	
- At switching voltage AC 5 ... 230 V	10	-	2000	
Switching load according to 	Max. AC 30 V, class 2 / max. DC 60 V, class 2			
External fusing (safety circuit) according to EN 60269-1	6 A gG or 6 A circuit breaker (characteristic B or C)			
Utilization category according to EN 60947-5-1	AC-12 60V 0.3A / DC-12 60V 0.3A AC-12 30V 6A / DC-12 30V 6A AC-15 230V 2A / DC-13 24V 3A			
Category according to EN 13849-1	4			
Classification acc. to EN 60947-5-3	PDF-M			
Rated insulation voltage U_i	250			V
Rated impulse withstand voltage U_{imp}	4			kV
Rated conditional short-circuit current	100			A
Resilience to vibration	As per EN 60947-5-2			
Mechanical operating cycles (relays)	10 x 10 ⁶			
Switching delay from state change ²⁾				
- 4 activated actuators	-	-	450	ms
- 3 activated actuators	-	-	370	
- 2 activated actuators	-	-	290	
- 1 activated actuator	-	-	210	
Time difference between the switching points of the two relays (with 4 activated actuators)	-	-	25	ms
Manual start operating mode				
- Duration of operation of start button	250	-	-	ms
- Start button response delay	-	200	300	
Current via feedback loop Y1/Y2	5	8	10	mA
Permissible resistance via feedback loop	-	-	600	Ω
Ready delay ³⁾	-	10	12	s
Dwell time ⁴⁾	3	-	-	s
Switching frequency max. ⁵⁾	-	-	0.25	Hz
Monitoring outputs (diagnostics DIA, door monitoring output 01...02, semiconductor output, p-switching, short circuit-protected)				
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	20	mA
Start button input S, test input TST				
- Input voltage LOW	0	-	2	V DC
- Input voltage HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
EMC protection requirements	As per EN 60947-5-3			

1) Without taking into account the load currents on the monitoring outputs.

2) Corresponds to the risk time according to EN 60947-5-3. This is the maximum switch-off delay for the safety outputs following removal of the actuator. In case of EMC interference in excess of the requirements in accordance with EN 60947-5-3, the switch-off delay can increase to max. 750 ms. After a brief actuation < 0.8 s, the switch-on delay can increase to max. 3 s if this is followed immediately by further actuation.

3) After the operating voltage is switched on, the relay outputs are switched off and the monitoring outputs are set LOW during the ready delay. For the visual indication of the delay, the green STATE LED flashes at a frequency of approx. 15 Hz.

4) The dwell time is the time that the actuator must be inside or outside the operating distance.

5) In the case of monitoring with feedback loop, the actuators must remain outside the operating distance, e.g. with a door open, until the feedback circuit is closed.

CES evaluation units combine transponder evaluation and a safety relay in one device

The CES evaluation units have two enable paths and monitoring outputs for each read head connected. The devices have an additional diagnostic output, which is set in the event of an error, as well as connections for a monitored start button and feedback loop.

Start button

Evaluation units with a connection for a start button permit a monitored, manual start. The relay is started by actuating a button. The button is monitored for jamming or possible tampering (monitoring of the falling edge). Prior to starting the evaluation unit, the safe state of the safety components connected must be re-established.

Feedback loop

Components connected downstream of the safety relay can be monitored for correct function. For this purpose normally closed contacts on these components are integrated into the feedback loop on the evaluation unit.

Guard lock monitoring with the safety system CES-AZ...

Evaluation units in the system family CES-AZ... monitor the guard locking in accordance with EN 1088. For information on which device combination can be used as guard locking in accordance with EN 1088, please refer to the table below.

Possible combinations

Evaluation unit	Read head	Actuator										
		CES-A-BBA 071 840	CES-A-BCA 088 786	CES-A-BDA 084 720	CES-A-BMB 077 791	CES-A-BQA 098 108	CES-A-NBA-... Alle Artikel	CES-A-BPA 098 775	CEM-A-BE05 094 805	CEM-A-BH10 095 175	CTK-A-BH50 099 392	CET-A-BWK-50X 096 327
CES-AZ-AES-01B 104 770 CES-AZ-UES-01B 105 139 CES-AZ-AES-02B 104 775 CES-AZ-UES-02B 105 140 CES-AZ-AES-04B 104 780 CES-AZ-UES-04B 105 141	CES-A-LNA... All items	●	●	●								
	CES-A-LNA-SC 077 715	●	●	●								
	CES-A-LCA... All items	●	●	●								
	CES-A-LMN-SC 077 790				●							
	CES-A-LQA-SC 095 650	●	●			●						
	CEM-A-LE05K-S2 094 800											
	CEM-A-LE05R-S2 095 792											
	CEM-A-LH10K-S3 095 170 CEM-A-LH10R-S3 095 793											
	CTK1-AX... All items											
	CET1-AX... All items											

Key to symbols	●	Combination possible
		Combination possible, guard locking for process protection
		Combination possible, guard locking for personal protection
		Combination not permissible

For read heads and actuators please refer to the catalogue **Non-Contact Safety Systems CES**.

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