Evaluation unit CES-AZ-AES-01B/ CES-AZ-UES-01B

1) 2)

- **1 read head can be connected**
- **2 safety outputs (relay contacts with 2 internally connected NO contacts per output)**
- **Start button and feedback loop can be connected**
- **Plug-in connection terminals**
- **Category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 24

Unicode evaluation
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
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 page 24.

Category according to EN ISO 13849-1
Due to two redundant safety paths (relay contacts) with 2 internal, monitored NO contacts per safety path, suitable for:
- Category 4 / PL e according to EN ISO 13849-1

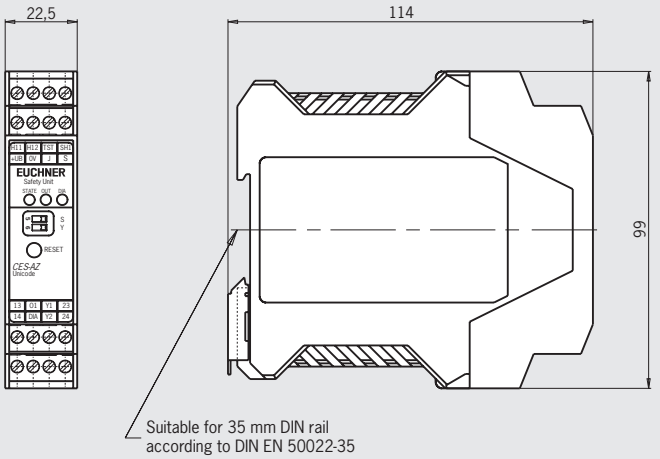
Each safety path is independently safe.

LED display
STATE Status LED
DIA Diagnostics LED
OUT Status safety output

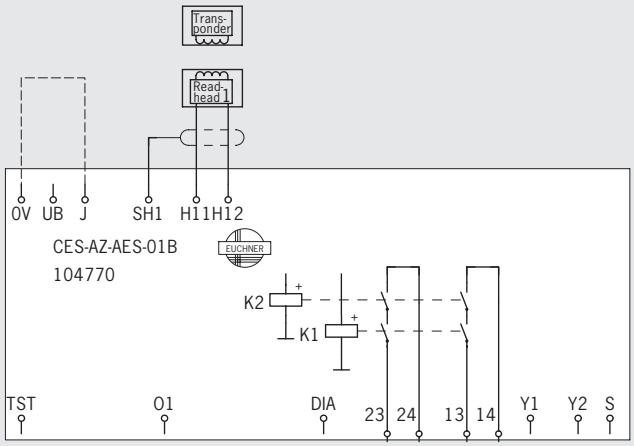
Evaluation unit CES-AZ-AES-01B

Cat. 4 PLe 1

Dimension drawing



Block diagram



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

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

Ordering table

Series	Category and PL according to EN ISO 13849-1	Number of read heads	Type	Order no. / item
CES-AZ-AES-01B Unicode	up to 4 / PL e	1		**104 770** 1) 3) CES-AZ-AES-01B
CES-AZ-AES-01B-EX Unicode	up to 4 / PL e	1	ATEX 2)	**105 142** 2) 3) CES-AZ-AES-01B-EX
CES-AZ-UES-01B Multicode	up to 4 / PL e	1		**105 139** 1) CES-AZ-UES-01B
Connection set for evaluation unit CES-AZ-.ES-01B			Plug-in Screw terminals	**104 756** CES-EA-TC-AK04-104756

1) BG approval pending
2) EX II (3) G [Ex nL] IIC (zone 2 gases), the evaluation unit is only allowed to be used outside potentially explosive atmospheres.
3) UL approval pending

Technical data evaluation unit CES-AZ-AES-01B

Parameter	Value min.	Value typ.	Value max.	Unit
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		IP20		
Degree of contamination		2		
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 cULus the following applies		Operation with UL-class 2 power supply only, or equivalent measures		
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)				mA
- At switching voltage AC/DC 21 ... 60 V	1	-	300	
- At switching voltage AC/DC 5 ... 30 V	10	-	4000	
- At switching voltage AC 5 ... 230 V (160 V ATEX)	10	-	2000	
Switching load according to cULus		Max. AC 30 V, class 2 / max. DC 60 V, class 2		
External fuse (safety circuit) according to EN 60269-1		6 A gG or 6 A circuit breaker (characteristic B or C)		
Utilization category acc. to EN 60947-5-1		AC-12 60V 0.3A / DC-12 60V 0.3A AC-12 30V 4A / DC-12 30V 4A AC-15 230V 2A / DC-13 24V 3A		
- For ATEX version		AC-12 60V 0.3A / DC-12 60V 0.3A AC-12 30V 4A / DC-12 30V 4A AC-15 160V 2A / DC-13 24V 3A		
Classification according 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		In acc. with EN 60947-5-2		
Mechanical operating cycles (relays)		10×10^6		
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
Repeat accuracy R according to EN IEC 60947-5-3		≤ 10		%
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
HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
EMC protection requirements		In acc. with EN 60947-5-3		
Reliability figures according to EN ISO 13849-1				
as a function of the switching current at 24 V DC	**≤ 0.1 A**	**≤ 1 A**	**≤ 3 A**	
Category		4		
Performance level (PL)		e		
PFH_d		1.9×10^{-8}		
Mission time		20		years
Number of switching cycles/year	760000	153000	34600	

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 door monitoring contact is 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 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.

Evaluation unit CES-AZ-AES-02B

- **2 read heads can be connected**
- **2 safety outputs (relay contacts with 2 internally connected NO contacts per output)**
- **Start button and feedback loop can be connected**
- **Plug-in connection terminals**
- **Category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 24

Unicode evaluation
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
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 page 24.

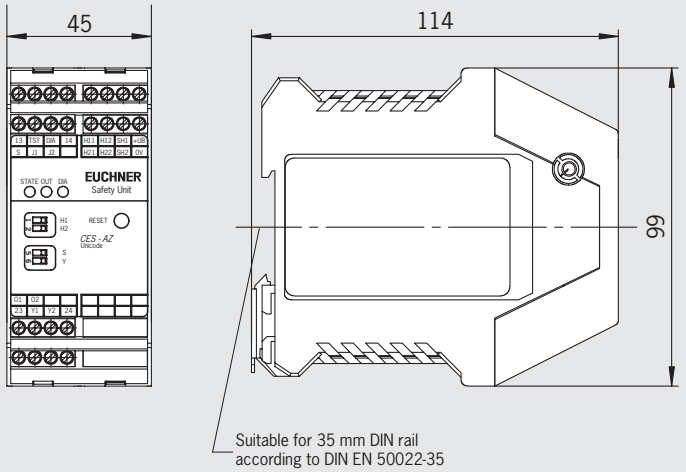
Category according to EN ISO 13849-1
Due to two redundant safety paths (relay contacts) with 2 internal, monitored NO contacts per safety path, suitable for:
- Category 4 / PL e according to EN ISO 13849-1

Each safety path is independently safe.

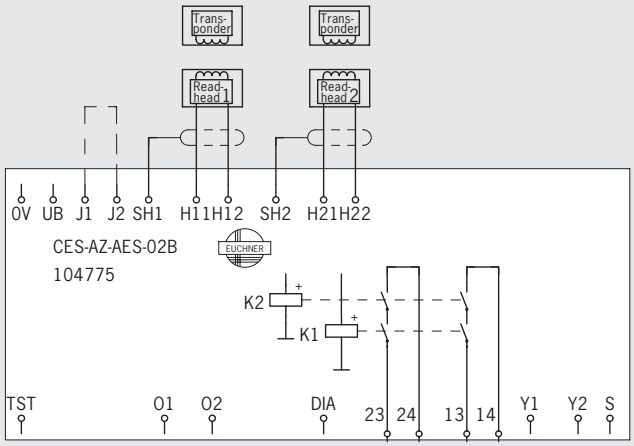
LED display
STATE Status LED
DIA Diagnostics LED
OUT Status safety output

Evaluation unit CES-AZ-AES-02B — Cat. 4 / PLe — 2

Dimension drawing



Block diagram



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

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

Ordering table

Series	Category and PL according to EN ISO 13849-1	Number of read heads	Type	Order no. / item
CES-AZ-AES-02B Unicode	up to 4 / PL e	2		**104 775** CES-AZ-AES-02B
CES-AZ-UES-02B Multicode	up to 4 / PL e	2		**105 140** CES-AZ-UES-02B
Connection set for evaluation unit CES-AZ-.ES-02B			Plug-in Screw terminals	**104 771** CES-EA-TC-AK06-104771

1) BG approval pending

Technical data evaluation unit CES-AZ-AES-02B

Parameter	Value min.	Value typ.	Value max.	Unit
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		IP20		
Degree of contamination		2		
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 cULus the following applies		Operation with UL-class 2 power supply only, or equivalent measures		
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	-	4000	
- At switching voltage AC 5 ... 230 V	10	-	2000	
Switching load according to cULus		Max. AC 30 V, class 2 / max. DC 60 V, class 2		
External fuse (safety circuit) according to EN 60269-1		6 A gG or 6 A circuit breaker (characteristic B or C)		
Utilization category acc. 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		
Classification according 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		In acc. with EN 60947-5-2		
Mechanical operating cycles (relays)		10×10^6		
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
Repeat accuracy R according to EN IEC 60947-5-3		≤ 10		%
Monitoring outputs (diagnostics DIA, release 01...02, semi-conductor 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
HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
EMC protection requirements		In acc. with EN 60947-5-3		
Reliability figures according to EN ISO 13849-1				
as a function of the switching current at 24 V DC	**≤ 0.1 A**	**≤ 1 A**	**≤ 3 A**	
Category		4		
Performance level (PL)		e		
PFH_d		1.9×10^{-8}		
Mission time		20		years
Number of switching cycles/year	760000	153000	34600	

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 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.

Evaluation unit CES-AZ-AES-04B

- **4 read heads can be connected**
- **2 safety outputs (relay contacts with 2 internally connected NO contacts per output)**
- **Start button and feedback loop can be connected**
- **Plug-in connection terminals**
- **Category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 24

Unicode evaluation
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
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 page 24.

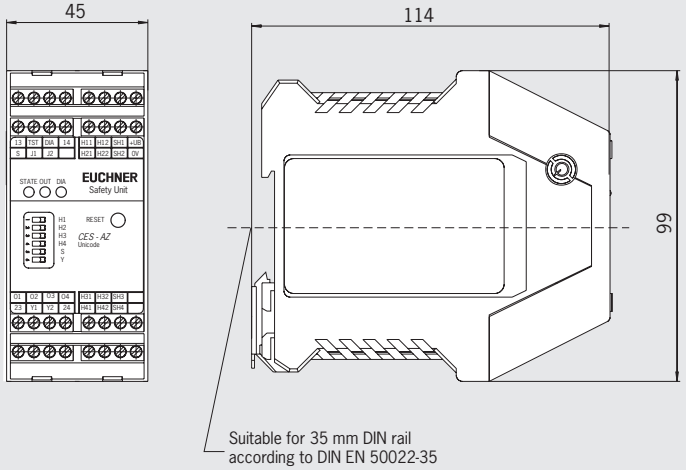
Category according to EN ISO 13849-1
Due to two redundant safety paths (relay contacts) with 2 internal, monitored NO contacts per safety path, suitable for:
- Category 4 / PL e according to EN ISO 13849-1

Each safety path is independently safe.

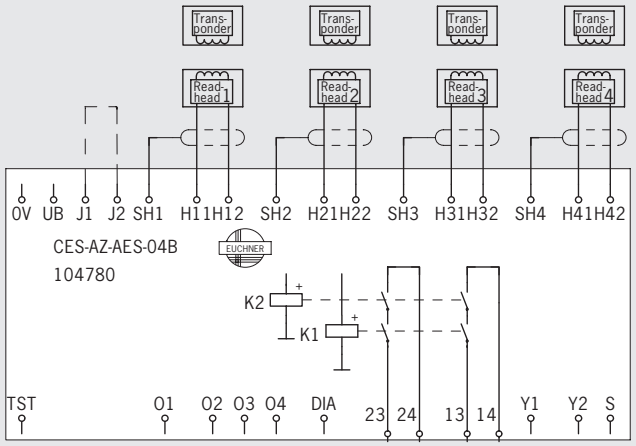
LED display
STATE Status LED
DIA Diagnostics LED
OUT Status safety output

Evaluation unit CES-AZ-AES-04B — Cat. 4 / PLe — 4

Dimension drawing



Block diagram



Additional connections
TST Input for self-test
O1...O4 Monitoring outputs (semiconductor)
DIA Diagnostics output
Y1, Y2 Feedback loop
S Start button connection

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

Ordering table

Series	Category and PL according to EN ISO 13849-1	Number of read heads	Type	Order no. / item
CES-AZ-AES-04B Unicode	up to 4 / PL e	4		**104 780** CES-AZ-AES-04B
CES-AZ-UES-04B Multicode	up to 4 / PL e	4		**105 141** CES-AZ-UES-04B
Connection set for evaluation unit CES-AZ-.ES-04B			Plug-in Screw terminals	**104 776** CES-EA-TC-AK08-104776

1) BG approval pending

Technical data evaluation unit CES-AZ-AES-04B

Parameter	Value min.	Value typ.	Value max.	Unit
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		IP20		
Degree of contamination		2		
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 cULus the following applies		Operation with UL-class 2 power supply only, or equivalent measures		
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	-	4000	
- At switching voltage AC 5 ... 230 V	10	-	2000	
Switching load according to cULus		Max. AC 30 V, class 2 / max. DC 60 V, class 2		
External fuse (safety circuit) according to EN 60269-1		6 A gG or 6 A circuit breaker (characteristic B or C)		
Utilization category acc. 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		
Classification according 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		In acc. with EN 60947-5-2		
Mechanical operating cycles (relays)		10×10^6		
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
Repeat accuracy R according to EN IEC 60947-5-3		≤ 10		%
Monitoring outputs (diagnostics DIA, release 01...02, semi-conductor 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
HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
EMC protection requirements		In acc. with EN 60947-5-3		
Reliability figures according to EN ISO 13849-1				
as a function of the switching current at 24 V DC	**≤ 0.1 A**	**≤ 1 A**	**≤ 3 A**	
Category		4		
Performance level (PL)		e		
PFH_d		1.9×10^{-8}		
Mission time		20		years
Number of switching cycles/year	760000	153000	34600	

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 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.