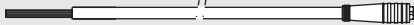
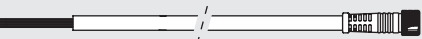
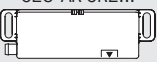
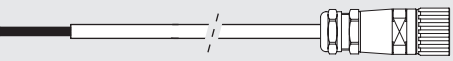
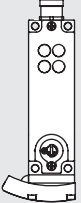
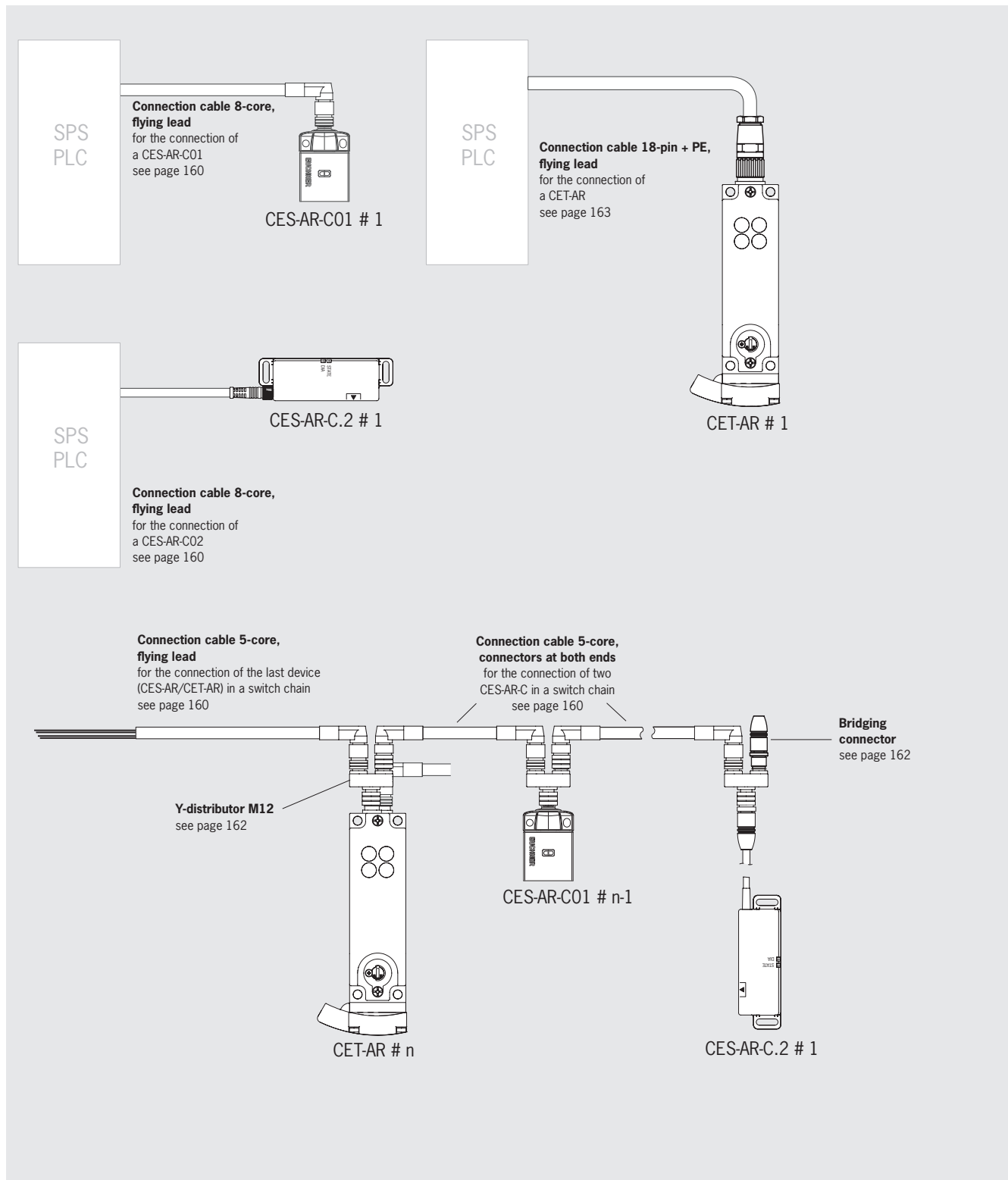


Component overview for non-contact safety switches CES-AR/CET-AR

Connection cable	Safety switch	Actuator	Bolt
 Page 160	CES-AR-C01...  Page 140	CES-A-BBA  Page 143 CES-A-BCA  Page 143 CES-A-BPA  Page 144 CES-A-BRN  Page 145	Page 177/178
 Page 160  Page 160	CES-AR-CR2...  Page 146	CES-A-BLN-R2  Page 150 CES-A-BLN-U2  Page 150 CES-A-BDN  Page 151	
 Page 163  Page 160	CET-AR...  Page 152	CET-A-BWK-50X  Page 153	Page 183



Usage of the connection cables



Possible combinations for CES components

To give you a quick overview of which CES components can be combined with each other, there is a combinations table for each evaluation unit and for each safety switch. The table will answer the following questions:

- Which actuator can be read by the selected safety switch?
- What is the operating distance of this combination?
- Which type of guard locking can be realized with the selected combination?

Important: Only typical values are listed in the table. The minimum and maximum values are listed in the technical data for the related product.

Key to symbols	15	Combination possible, typ. switch-on distance 15 mm
		Combination possible, guard locking for process protection
		Combination possible, guard locking for personal protection
		Combination not permissible

Non-contact safety switches CES-AR/CET-AR

Safety switch	Actuator								
	CES-A-BBA 071840	CES-A-BCA 088786	CES-A-BPA 098775	CES-A-BRN 100251	CES-A-BLN-R2-100776 100776	CES-A-BLN-L2-104510 104510	CES-A-BLN-U2-103450 103450	CES-A-BDN-06-104730 104730	CET-A-BWK-50X 096327
CES-AR-C01...	18	18	22	27					
CES-AR-CR2...					15		15	19	
CES-AR-CL2...						15	15	19	
CET-AR...									

External evaluation unit CES-AR-AES (Which safety switches can be connected?)

Safety switch	Evaluation unit
	CES-AR-AES-12
CES-AR-C01...	From V 1.1.2 (see rating plate on the device)
CES-AR-CR2...	
CES-AR-CL2...	
CET1-AR-... CET2-AR-...	From V 1.1.2 (see rating plate on the device)

Non-contact safety switches CES-AR-C01...

- ▶ Read head with integrated evaluation electronics
- ▶ Up to 20 switches in series
- ▶ Short circuit monitoring
- ▶ 2 safety outputs (semiconductor outputs)
- ▶ Category 4 / PL e acc. to EN ISO 13849-1



For possible combinations see page 139

Approach direction

Can be adjusted in 90° steps

Short circuit monitoring

The switch generates its own clock signal on the output cables OA/OB. Pay attention to this aspect when connecting to control systems and relays.

Unicode evaluation

Each actuator is unique. The safety switch detects only the actuator that has been taught-in. Additional actuators can be taught-in. Only the last actuator taught-in is detected.

Multicode evaluation

Every suitable actuator is detected by the safety switch.

Fixcode evaluation

An actuator CES-A-BPA is permanently allocated to the evaluation unit. The evaluation unit can be operated only with this actuator. The actuator is taught-in at EUCHNER prior to delivery. No additional actuators can be taught-in.

Category according to EN ISO 13849-1

Due to two redundant design semiconductor outputs (safety outputs) with internal monitoring suitable for:

- ▶ Category 4 / PL e according to EN ISO 13849-1

Important: To achieve the stated category in accordance with EN ISO 13849-1, both safety outputs (OA and OB) must be evaluated.

LED indicator

STATE Status LED
DIA Diagnostics LED

Additional connections

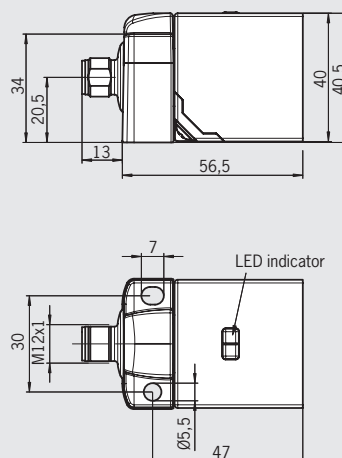
OUT Monitoring output (semiconductor)
RST Reset input

Non-contact safety switches CES-AR-C01... M12 plug, 8-pin



Cat. 4
PL e
1...20

Dimension drawing



For connection cable see page 160

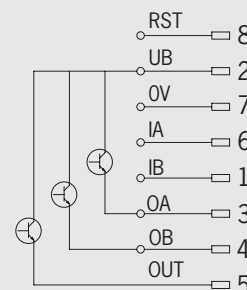
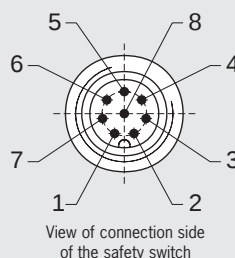
Block diagram

1	IB	2	UB	3	OA	4	OB	5	OUT	6	IA	7	OV	8	RST
M12 plug-connector (8-pin)															
CES-AR															

Connection examples see page 167

Terminal assignment

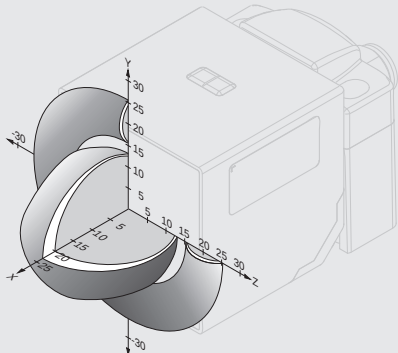
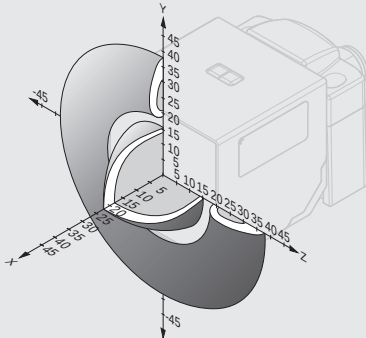
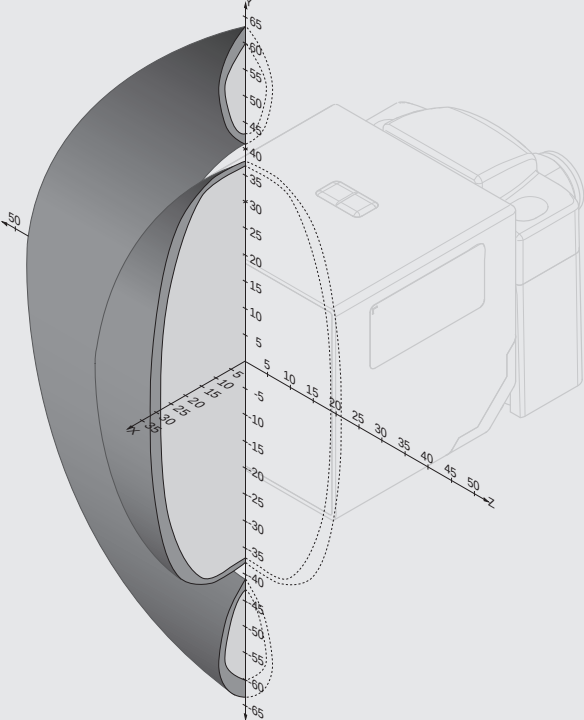
Pin	Designation	Description	Wire color acc. to DIN 47100
1	IB	Enable input for channel 2	white
2	UB	Power supply, DC 24 V	brown
3	OA	Safety output, channel 1	green
4	OB	Safety output, channel 2	yellow
5	OUT	Monitoring output	gray
6	IA	Enable input for channel 1	pink
7	OV	Ground, DC 0 V	blue
8	RST	Reset input	red



Ordering table

Series	Category and PL according to EN ISO 13849-1	Order no.
CES-AR-C01-AH-SA Unicode	4 / PL e	098941 CES-AR-C01-AH-SA
CES-AR-C01-CH-SA Multicode	4 / PL e	098942 CES-AR-C01-CH-SA
CES-AR-C01-EH-SA Fixcode (Actuator CES-A-BPA  included)	4 / PL e	098582 CES-AR-C01-EH-SA

Typical operating distances

 	Safety switch CES-AR-C01-...	
CES-A-BBA  Page 143 CES-A-BCA  Page 143	 For a side approach direction for the actuator and safety switch, a minimum distance of $s = 4$ mm must be maintained so that the operating distance of the side lobes is not entered.	
CES-A-BPA  Page 144	 For a side approach direction for the actuator and safety switch, a minimum distance of $s = 4$ mm must be maintained so that the operating distance of the side lobes is not entered.	
CES-A-BRN  Page 145	 For a side approach direction for the actuator and safety switch, a minimum distance of $s = 6$ mm must be maintained so that the operating distance of the side lobes is not entered.	CES-AR/CET-AR

Technical data non-contact safety switches CES-AR-C01...

Parameter	min.	Value typ.	max.	Unit
Housing material		PBT V0 GF30		
Dimensions		According to EN 60947-5-2		mm
Weight		0.17		kg
Ambient temperature at $U_B = DC 24 V$	-20	-	+55	°C
Degree of protection		IP67		
Safety class		III		
Degree of contamination		3		
Installation position		Any		
Connection		M12 plug connector, 8-pin		
Operating voltage U_B (reverse polarity protected, regulated, residual ripple < 5%)		24 ± 15%		V DC
For the approval according to UL the following applies		Operation only with UL Class 2 power supply, or equivalent measures		
Current consumption		80		mA
Switching load according to «UL»		DC 24 V, class 2		
External fuse (operating voltage U_B)	0.25	-	8	A
Classification acc. to EN 60947-5-3		PDF-M		
EMC protection requirements		In acc. with EN 60947-5-3		
Safety outputs (OA/OB, 2 semiconductor outputs, p-switching, short circuit-proof)				
- Output voltage $U(OA/U(OB))^{1)}$				
HIGH $U(OA)$	$U_B - 1.5$	-	U_B	V DC
HIGH $U(OB)$	$U_B - 1.5$	-	U_B	
LOW $U(OA)/U(OB)$	0	-	1	
Switching current per safety output	1	-	400	mA
Utilization category according to EN 60947-5-2		DC-13 24 V 400mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads		
Off-state current I_i		≤ 0.25		mA
Rated insulation voltage U_i	-	-	300 ²⁾	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Resilience to vibration		According to EN 60947-5-2		
Switching frequency	-	-	1	Hz
Repeat accuracy R		≤ 10		%
Monitoring output (OUT) (Semiconductor output, p-switching, short circuit-proof)				
Output voltage	$0.8 \times U_B$	-	U_B	V DC
Max. load	-	-	200	mA
In combination with actuator CES-A-BBA/CES-A-BCA				
Operating distance for center offset $m = 0$				
- Switch-on distance	-	18	-	
- Assured switch-on distance $s_{ao}^{3)}$	15	-	-	mm
- Switching hysteresis ³⁾	1	3	-	
- Assured switch-off distance s_{ar}	-	-	45	
In combination with actuator CES-A-BPA				
Operating distance for center offset $m = 0$				
- Switch-on distance	-	22 ³⁾	-	
- Assured switch-on distance s_{ao}	18	-	-	mm
- Switching hysteresis ³⁾	1	2	-	
- Assured switch-off distance s_{ar}	-	-	58	
In combination with actuator CES-A-BRN				
Operating distance for center offset $m = 0$				
- Switch-on distance	-	27 ⁴⁾	-	
- Assured switch-on distance s_{ao}	20	-	-	mm
- Switching hysteresis ⁵⁾	-	3	-	
- Assured switch-off distance s_{ar}	-	-	75	
Reliability values according to EN ISO 13849-1				
Category		4		
Performance Level (PL)		e		
PFH_d		$2.1 \times 10^{-9} / h^{6)}$		
Mission time		20		years

1) Values at a switching current of 50 mA without taking into account the cable lengths.

2) Tested by employers' liability insurance association (DGUV) up to 75 V.

3) Values apply for surface mounting of the actuator.

4) On surface mounting on aluminum, in a non-metallic environment the typical switching distance increases to 30 mm.

5) In case of surface mounting on steel.

6) Applying the limit value from EN ISO 13849-1:2008, Section 4.5.2 ($MTTF_d = \max. 100 \text{ years}$), the employers' liability insurance association (DGUV) certifies a PFH_d of 2.47×10^{-8} .

Actuator CES-A-BBA/CES-A-BCA

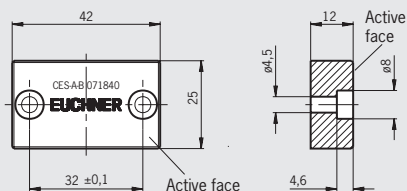
- Rectangular design
42 x 25 mm



For possible combinations see page 139

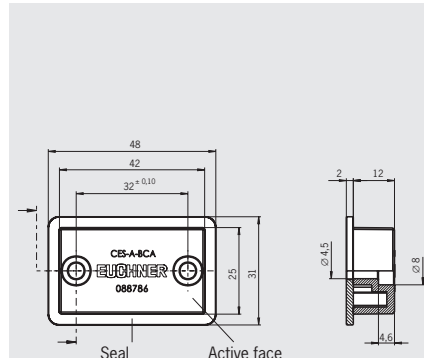
Actuator CES-A-BBA

Dimension drawing



2 safety screws
M4x14 included

Actuator CES-A-BCA Housing material PE-HD



2 safety screws
M4x14 included

Ordering table

Series	Comment	Version	Order no.
CES-A-BBA	2 safety screws M4 x 14 are supplied	-	071840 CES-A-BBA
CES-A-BCA	2 safety screws M4 x 14 are supplied Flat seal included	Housing material PE-HD ¹⁾	088786 CES-A-BCA

1) Suitable for use in aggressive media (e. g. acids, alkalis)

Technical data

Parameter	min.	Value typ.	max.	Unit
Housing material				
- CES-A-BBA		Fortron, reinforced thermoplastic, fully encapsulated		
- CES-A-BCA		Plastic PE-HD without reinforcement, fully encapsulated		
Flat seal material (CES-A-BCA only)		Fluororubber 75 FPM 4100		
Dimensions		42 x 25 x 12		mm
Weight		0.02		kg
Ambient temperature				
- CES-A-BBA	-25	-	+70	°C
- CES-A-BCA	-25	-	+50	
Degree of protection		IP67/IP69K		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

Actuator CES-A-BPA

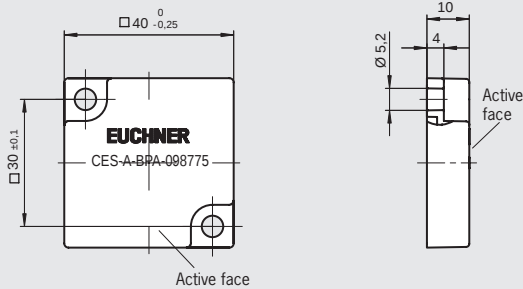
- Rectangular design
40 x 40 mm



For possible combinations see page 139

Actuator CES-A-BPA

Dimension drawing



2 safety screws
M5x10 included

Ordering table

Series	Comment	Version	Order no.
CES-A-BPA	2 safety screws M5 x 10 are supplied	-	098775 CES-A-BPA

Technical data

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	PBT			
Weight	0.025			kg
Degree of protection acc. to IEC 60529	IP67/IP69K			
Ambient temperature	-25	-	+70	°C
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

Actuator CES-A-BRN

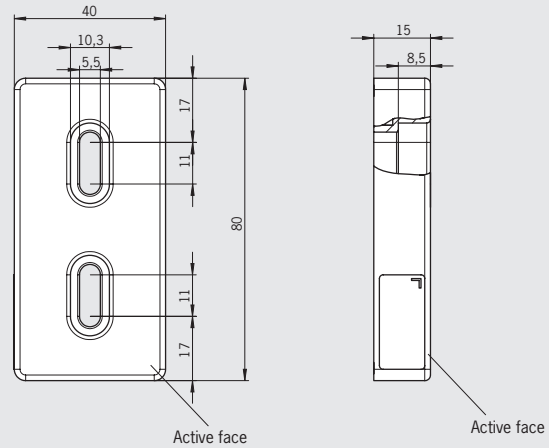
- Rectangular design
80 x 40 mm



For possible combinations see page 139

Actuator CES-A-BRN

Dimension drawing



Ordering table

Series	Comment	Version	Order no.
CES-A-BRN	2 safety screws M5 x 16 are supplied	-	100251 CES-A-BRN-100251

Technical data

Parameter	min.	Value typ.	max.	Unit
Housing material		PPS		
Dimensions		80 x 40 x 15		mm
Weight		0.06		kg
Ambient temperature	-25	-	+70	°C
Degree of protection acc. to EN IEC 60529		IP67		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		



Non-contact safety switches CES-AR-C.2-...

- ▶ Read head with integrated evaluation electronics
- ▶ Up to 20 switches in series
- ▶ Short circuit monitoring
- ▶ 2 safety outputs (semiconductor outputs)
- ▶ Category 4 / PL e according to EN ISO 13849-1



For possible combinations see page 139

Approach direction

For approach directions see illustration "Approach directions and minimum distance" on page 135.

Short circuit monitoring

The switch generates its own clock signal on the output cables OA/OB. Pay attention to this aspect when connecting to control systems and relays.

Unicode evaluation

Each actuator is unique. The safety switch detects only the actuator that has been taught-in. Additional actuators can be taught-in. Only the last actuator taught-in is detected.

Multicode evaluation

Every suitable actuator is detected by the safety switch.

Category according to EN ISO 13849-1

Due to two redundant design semiconductor outputs (safety outputs) with internal monitoring suitable for:

- ▶ Category 4 / PL e according to EN ISO 13849-1

Important: To achieve the stated category in accordance with EN ISO 13849-1, both safety outputs (OA and OB) must be evaluated.

LED indicator

STATE Status LED

DIA Diagnostics LED

Additional connections

OUT Monitoring output (semiconductor)

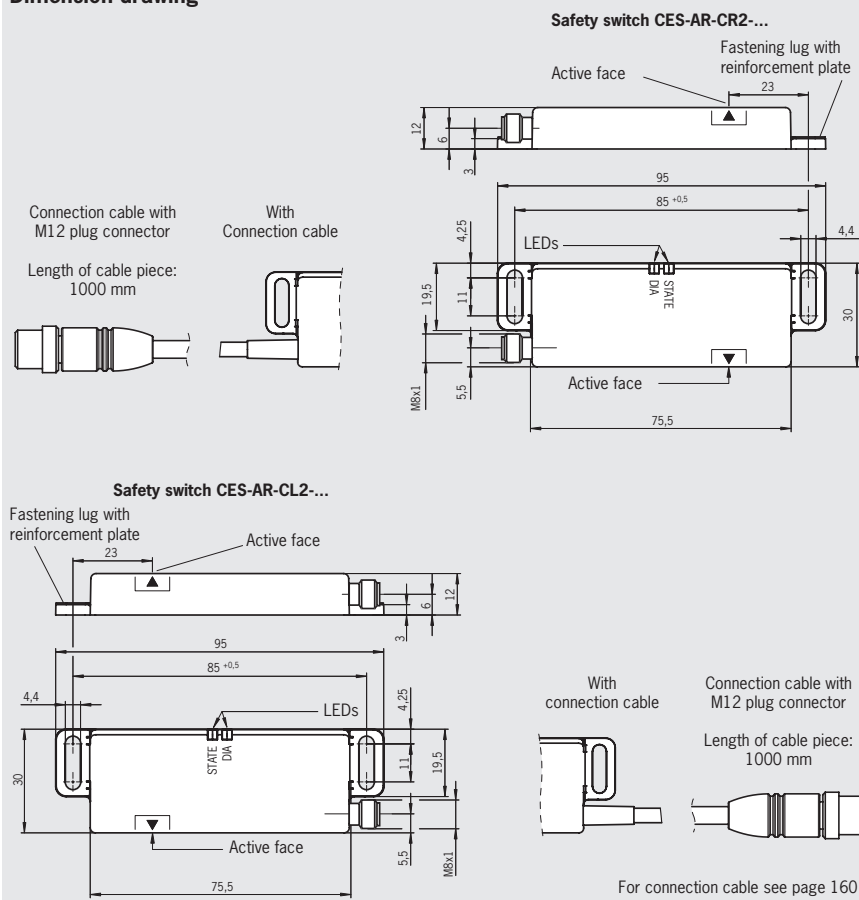
RST Reset input

For ordering table see page 149.

Non-contact safety switches CES-AR-C.2-...

Cat. 4
PL e 1...20

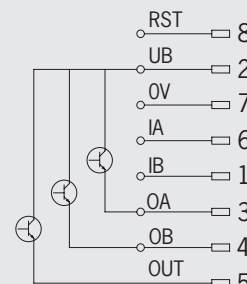
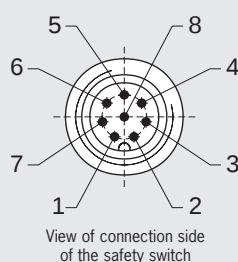
Dimension drawing



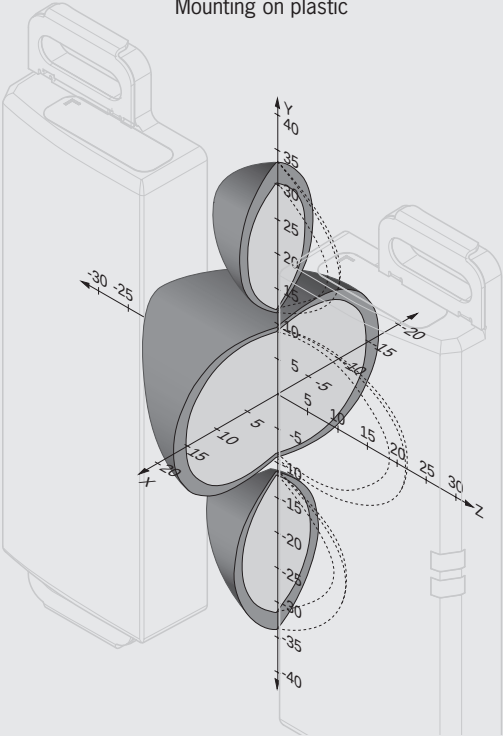
For connection cable see page 160

Terminal assignment

Pin	Designation	Description	Wire color acc. to DIN 47100
1	IB	Enable input for channel 2	white
2	UB	Power supply, DC 24 V	brown
3	OA	Safety output, channel 1	green
4	OB	Safety output, channel 2	yellow
5	OUT	Monitoring output	gray
6	IA	Enable input for channel 1	pink
7	OV	Ground, DC 0 V	blue
8	RST	Reset input	red



Typical operating distances

 	Safety switch CES-AR-C.2-...
Actuator CES-A-BLN...  Page 150  Page 150	Mounting on plastic  For a side approach direction for the actuator and safety switch, a minimum distance of $s = 6 \text{ mm}$ must be maintained so that the operating distance of the side lobes is not entered.
CES-A-BDN-06  Page 151	Operating distance as for actuator CES-A-BLN... (see above)

Attention:

The operating distance may vary depending on the background material and installation situation.

Technical data non-contact safety switches CES-AR-C.2-...

Parameter	min.	Value typ.	max.	Unit
Housing material		PBT VO GF30		
Dimensions		95 x 30 x 12		mm
Weight		0.04		kg
Ambient temperature at $U_B = DC 24 V$	-20	-	+55	°C
Storage temperature	- 20	-	+ 70	
Degree of protection		IP69K (IP67 for version with M12 plug connector)		
Safety class		III		
Degree of contamination		3		
Installation position		Any		
Connection		Plug connector or connection cable		
Operating voltage U_B (reverse polarity protected, regulated, residual ripple < 5%)		24 ± 15%		V DC
For the approval according to UL the following applies		Operation only with UL Class 2 power supply, or equivalent measures		
Current consumption		50		mA
Switching load according to „ UL “		DC 24 V, class 2		
External fuse (operating voltage U_B)	0.25	-	1.5	A
EMC protection requirements		In acc. with EN 60947-5-3		
Safety outputs (OA/OB, 2 semiconductor outputs, p-switching, short circuit-proof)				V DC
- Output voltage $U(OA/U(OB))^{1)}$				
HIGH $U(OA)$	$U_B - 1.5$	-	U_B	
HIGH $U(OB)$	$U_B - 1.5$	-	U_B	
LOW $U(OA)/U(OB)$	0	-	1	
Switching current per safety output	1	-	400	mA
Utilization category according to EN 60947-5-2		DC-13 24 V 400mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads		
Off-state current I_r		≤ 0.25		mA
Classification acc. to EN 60947-5-3		PDF-M		
Monitoring output (OUT) (Semiconductor output, p-switching, short circuit-proof)				V DC
- Output voltage	$0.8 \times U_B$	-	U_B	
- Max. load	-	-	200	mA
Rated insulation voltage U_i	-	-	75	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Resilience to vibration		According to EN 60947-5-2		
Switching frequency	-	-	1	Hz
Repeat accuracy R		≤ 10		%
In combination with actuator CES-A-BLN...²⁾				
Operating distance for center offset $m = 0$				mm
- Switch-on distance	-	15	-	
- Assured switch-on distance s_{ao}	10	-	-	
- Switching hysteresis ²⁾	1	2	-	
- Assured switch-off distance s_{ar} in x/z direction	-	-	40	
in y direction	-	-	60	
In combination with actuator CES-A-BDN²⁾				
Operating distance for center offset $m = 0$				mm
- Switch-on distance	-	19	-	
- Assured switch-on distance s_{ao}	14	-	-	
- Switching hysteresis ²⁾	-	2	-	
- Assured switch-off distance s_{ar} in x/z direction	-	-	40	
in y direction	-	-	60	
Reliability values according to EN ISO 13849-1				
Category		4		
Performance Level (PL)		e		
PFH _d		$1.9 \times 10^{-9} / h^{3)}$		
Mission time		20		years

1) Values at a switching current of 50 mA without taking into account the cable lengths.

2) The operating distance may vary depending on the background material and installation situation.

3) Applying the limit value from EN ISO 13849-1:2008, Section 4.5.2 (MTTF_d = max. 100 years), the employers' liability insurance association certifies a PFH_d of 2.47×10^{-8} .



Ordering table

Series	Comment	Version	Order no. / item
Safety switch CES-AR-C.2-AH-... Unicode	2 safety screws M4 X 14 and reinforcement plates included	Door hinge right, plug connector M8, 8-pin	105751 CES-AR-CR2-AH-SG-105751
		Door hinge left, plug connector M8, 8-pin	105753 CES-AR-CL2-AH-SG-105753
		Door hinge right, connection cable PUR, length 1 m, with plug connector M12, 8-pin	105746 CES-AR-CR2-AH-SA-105746
		Door hinge left, connection cable PUR, length 1 m, with plug connector M12, 8-pin	105748 CES-AR-CL2-AH-SA-105748
		Door hinge right, connection cable PUR, 8 x 0,14 mm ² , length 5 m	109046 CES-AR-CR2-AH-L05-109046
		Door hinge left, connection cable PUR, 8 x 0,14 mm ² , length 5 m	109047 CES-AR-CL2-AH-L05-109047
		Door hinge right, connection cable PUR, 8 x 0,14 mm ² , length 10 m	109050 CES-AR-CR2-AH-L10-109050
		Door hinge left, connection cable PUR, 8 x 0,14 mm ² , length 10 m	109051 CES-AR-CL2-AH-L10-109051
		Door hinge right, connection cable PUR, 8 x 0,14 mm ² , length 20 m	109054 CES-AR-CR2-AH-L20-109054
		Door hinge left, connection cable PUR, 8 x 0,14 mm ² , length 20 m	109055 CES-AR-CL2-AH-L20-109055
Safety switch CES-AR-C.2-CH-... Multicode	2 safety screws M4 X 14 and reinforcement plates included	Door hinge right, plug connector M8, 8-pin	105750 CES-AR-CR2-CH-SG-105750
		Door hinge left, plug connector M8, 8-pin	105752 CES-AR-CL2-CH-SG-105752
		Door hinge right, connection cable PUR, length 1 m, with plug connector M12, 8-pin	105745 CES-AR-CR2-CH-SA-105745
		Door hinge left, connection cable PUR, length 1 m, with plug connector M12, 8-pin	105747 CES-AR-CL2-CH-SA-105747
		Door hinge right, connection cable PUR, 8 x 0,14 mm ² , length 5 m	109044 CES-AR-CR2-CH-L05-109044
		Door hinge left, connection cable PUR, 8 x 0,14 mm ² , length 5 m	109045 CES-AR-CL2-CH-L05-109045
		Door hinge right, connection cable PUR, 8 x 0,14 mm ² , length 10 m	109048 CES-AR-CR2-CH-L10-109048
		Door hinge left, connection cable PUR, 8 x 0,14 mm ² , length 10 m	109049 CES-AR-CL2-CH-L10-109049
		Door hinge right, connection cable PUR, 8 x 0,14 mm ² , length 20 m	109052 CES-AR-CR2-CH-L20-109052
		Door hinge left, connection cable PUR, 8 x 0,14 mm ² , length 20 m	109053 CES-AR-CL2-CH-L20-109053

Actuator CES-A-BLN...

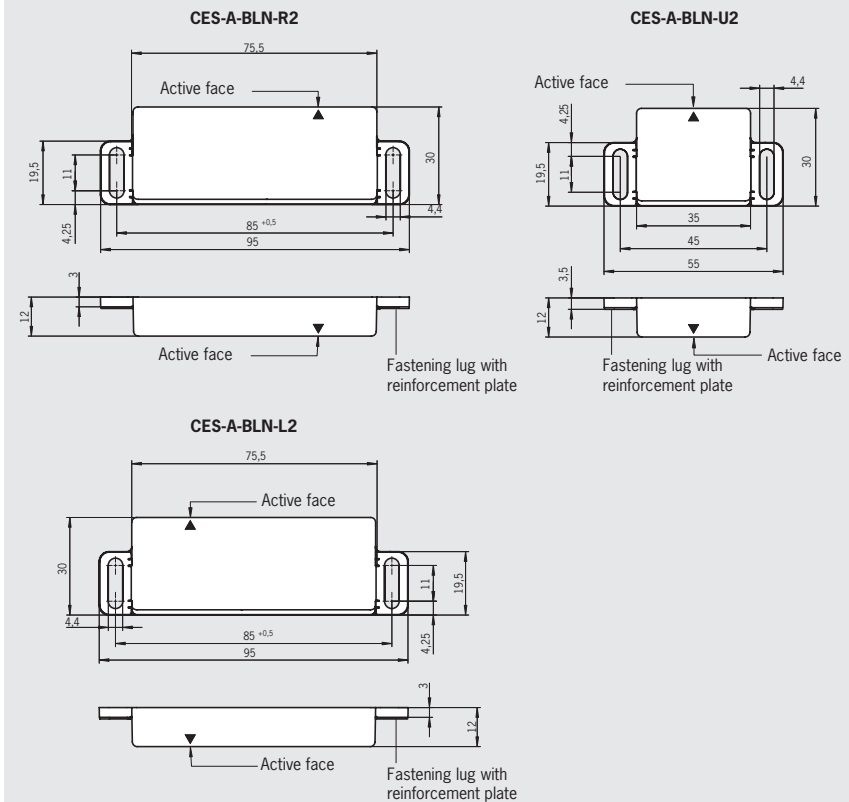
- Rectangular design 55 x 30 mm and 95 x 30 mm



For possible combinations see page 139

Actuator CES-A-BLN...

Dimension drawing



Ordering table

Series	Comment	Version	Order no./Article
Actuator CES-A-BLN...	2 safety screws M4 X 14 and reinforcement plates included	95 mm x 30 mm x 12 mm Door hinge right	100776 CES-A-BLN-R2-100776
		95 mm x 30 mm x 12 mm Door hinge left	104510 CES-A-BLN-L2-104510
		55 mm x 30 mm x 12 mm Usage independent of position of door hinge	103450 CES-A-BLN-U2-103450

Technical data

Parameter	min.	Value typ.	max.	Unit
Housing material		Plastic PBT		
Dimensions - CES-A-BLN-R2/CES-A-BLN-L2 - CES-A-BLN-U2		95 x 30 x 12 55 x 30 x 12		mm
Weight - CES-A-BLN-R2/CES-A-BLN-L2 - CES-A-BLN-U2		0.04 0.02		kg
Ambient temperature	- 40	-	+ 70	°C
Degree of protection according to EN 60529		IP67/IP69K		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

Actuator CES-A-BDN-06

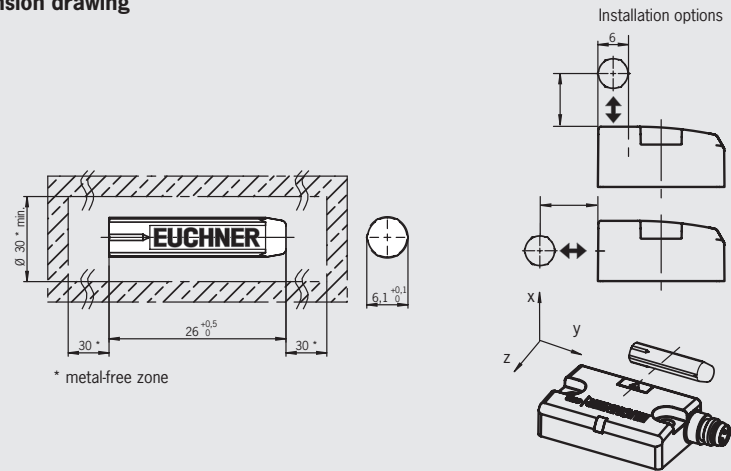
► Cylindrical design Ø 6 mm



For possible combinations see page 139

Actuator CES-A-BDN-06

Dimension drawing



Ordering table

Series	Comment	Version	Order no. / item
CES-A-BDN-06			104730 CES-A-BDN-06-104730

Technical data

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Macromelt PA-based plastic			
Dimensions	26 x Ø 6			mm
Weight	0.005			kg
Ambient temperature	-40	-	+70	°C
Degree of protection	IP67 / IP69K ¹⁾			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

1) With flush installation