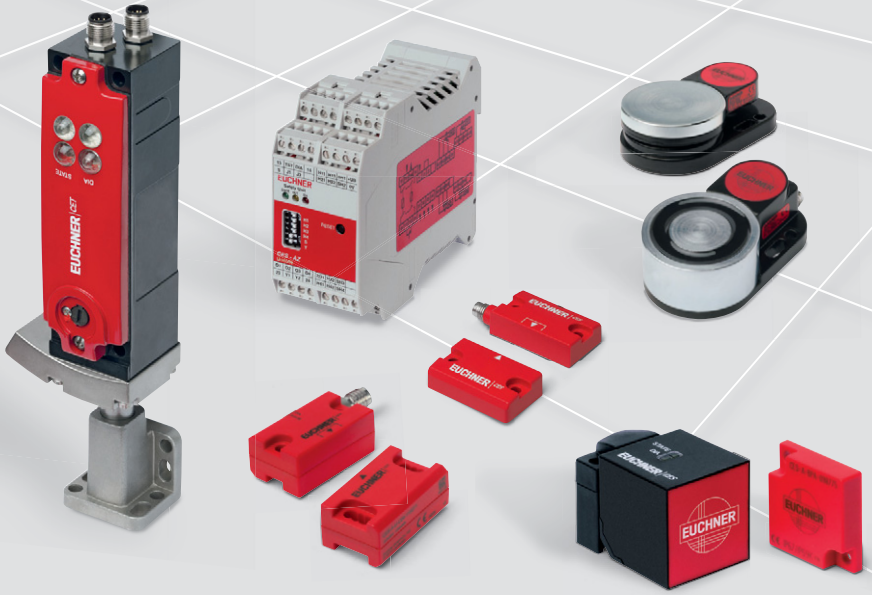
EN

Transponder-coded Safety Systems



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More than safety.

EUCHNER

More than safety.

Headquarters in Leinfelden-Echterdingen

Logistics center in Leinfelden-Echterdingen

Production location in Unterböhringen

Internationally successful – the EUCHNER company

EUCHNER GmbH + Co. KG is a world-leading company in the area of industrial safety technology. EUCHNER has been developing and producing high-quality switching systems for mechanical and systems engineering for more than 50 years.
The medium-sized family-operated company based in Leinfelden, Germany, employs more than 500 people around the world, 400 in Germany alone.

In addition to the production locations in Unterböhringen and Shanghai/China, 15 subsidiaries and other sales partners in Germany and abroad work for our international success on the market.

Quality and innovation – the EUCHNER products

A look into the past shows EUCHNER to be a company with a great inventive spirit. We take the technological and ecological challenges of the future as an incentive for extraordinary product developments.

EUCHNER safety switches monitor safety doors on machines and installations, help to minimize dangers and risks and thereby reliably protect people and processes. Today, our products range from electromechanical and electronic components to intelligent integrated safety solutions. Safety for people, machines and products is one of our dominant themes.

We define future safety technology with the highest quality standards and reliable technology. Extraordinary solutions ensure the great satisfaction of our customers. The product ranges are subdivided as follows:

- Transponder-coded Safety Switches (CES)
- Transponder-coded Safety Switches with guard locking (CET)
- Interlocking and guard locking systems (Multifunctional Gate Box MGB)
- Access management systems (Electronic-Key-System EKS)
- Electromechanical Safety Switches
- Magnetically coded Safety Switches (CMS)
- Enabling Switches
- Safety Relays
- Emergency Stop Devices
- Hand-Held Pendant Stations and Handwheels
- Safety Switches with AS-Interface
- Joystick Switches
- Position Switches

made in Germany

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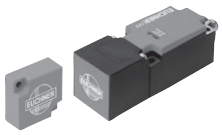

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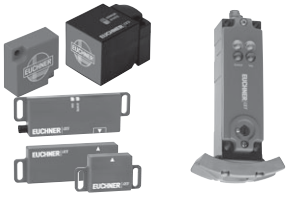

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076649-18-11/13

The advantages of the CES system at a glance

- Uniquely coded actuator
- Maximum protection against tampering
- The actuator can be rotated within the read head's operating distance
- Can be used in a harsh environment
- Dirt on the surface does not reduce the operating distance
- Precise door guides are not required

General information

According to EN 1088, interlocking devices are mechanical or electrical devices which are designed to prevent the operation of a machine element for as long as the movable safety guard is left open.

Non-contact safety switches and safety systems CES are interlocking devices which are designed to protect people and machines. Compared with electromechanical safety switches, they are used if:

- a high level of protection against tampering must be achieved,
- extremely hygienic environmental conditions are required (e.g. in the food industry),
- a precise door guide is not possible,
- machine doors are subjected to strong vibrations,
- a high category according to EN ISO 13849-1 is stipulated during the risk analysis

The CES transponder technology

The non-contact safety systems described here operate on the basis of a uniquely electronically coded actuator (transponder). The name transponder is a combination of the two terms transmitter and responder. The function of a transponder is easily explained:

the transponder (actuator) receives and processes the electromagnetic field from a transceiver (read head), and the data signals are then sent back to the read head (evaluation unit) as a response depending on the transponder coding. Power is supplied and data transmitted to the coded actuator by induction using a read head. The major advantage of the system is that the actuator does not contain any batteries and is therefore maintenance-free giving the user many years of service-free operation. The best known application for transponder technology is, for instance, the electronic immobilizer in automotive applications.

Operating distances
The operating distances indicate the distance between the actuator and sensor from with a switching process is triggered. There are typical and assured operating distances for each system. The assured operating distances are defined in the EN 60947-5-3 standard and listed below.

Assured switch-off distance s_{ar}
According to EN 60947-5-3, the assured switch-off distance is the distance from the active sensor face outside which the actuator is no longer detected under any environmental conditions, manufacturing tolerances and fault conditions, so that the system switches off.

Assured switch-on distance s_{ao}
According to EN 60947-5-3, the assured switch-on distance is the distance from the active sensor face within which the presence of the actuator is correctly detected under all defined environmental conditions and manufacturing tolerances.

The CES system

The Coded Electronic Safety system CES comprises three components:

- Coded actuator
- Read head
- Evaluation unit

In some systems, the read head and evaluation unit form a sealed unit. In this case the term safety switch is used, as all safety functions are integrated into one component (see section on safety switches further down).

The system then consists of the components:

- Coded actuator
- Safety switch (read head with integrated evaluation)

Coded actuators
Each actuator supplied has a unique code and is therefore a unique element. The code in an actuator cannot be reprogrammed.

Read heads
The read head is fastened to the fixed part of the safety guard and is connected to the evaluation unit via a two-core screened cable. The actuator fastened to the safety guard is moved towards the read head by closing the door. When the switch-on distance is reached, power is supplied to the actuator via the read head and the read head transfers the actuator's data to the evaluation unit.

Actuator and read head have a wide operating distance and a broad hysteresis. Misalignment of the door will therefore not result in the system switching off unintentionally. If the actuator is positioned exactly at the limit of the switch-on distance, vibration at the safety guard will not cause the machine to stop unintentionally.

EUCHNER provides read heads in a very wide range of designs with and without guard locking (see next section).

Read heads with guard locking
Guard locking is a feature that prevents the unintentional opening of a door as long as there is a hazard. For this purpose, EUCHNER has read heads with guard locking in its range. They function like any other CES read head, but also contain a guard locking mechanism. Depending on the read head series and the evaluation unit used, varying levels of safety can be achieved. You will find exact information on the level of safety that can be achieved in the combination tables for each product.

Evaluation units
CES evaluation units combine transponder evaluation and a safety relay in one device.
The read head is connected to the CES evaluation unit. This unit checks the actuator's bit pattern. The data transmission from the read head to the evaluation unit is dynamic and single-channel. All potential faults (e.g. broken cable, short circuit, failure of the actuator, etc.) are reliably detected. The number of read heads that can be connected depends on the evaluation unit.

The evaluation units have enable paths with which devices such as relays or contactors can be switched. If the evaluation unit detects a valid actuator, the evaluation unit closes its enable paths.

How the evaluation is performed in detail depends on whether the evaluation unit is a unicode or multicode evaluation unit.

Unicode evaluation
With the unicode version, the actuators must be taught-in on the evaluation unit. During teach-in the actuator code is assigned to the evaluation unit. This code is saved in the evaluation unit. Whenever an actuator is read, the evaluation unit compares the code just read with the code saved. Only if the two bit patterns are identical, the actuator is recognized and the enable paths are closed. The number of possible teach-in operations is dependent of the evaluation unit used. Only the last actuator taught-in is detected. The unicode principle provides a high level of protection against tampering.

Fixcode evaluation
In case of fixcode devices, the teach-in operation is performed prior to delivery at EUCHNER. An actuator is permanently assigned to the device in this process. The device can be operated only with this one actuator. No additional actuators can be taught-in.

Multicode evaluation
Unlike systems with unique code detection, with multicode evaluation a specific actuator code is not requested, instead it is only checked whether the actuator is of a type from EUCHNER that can be detected by the system (multicode detection). There is no exact comparison of the actuator code with the code saved in the evaluation unit. As a result a teach-in operation for the actuator is not necessary.

Safety switches
On the safety switches, read head and evaluation unit are integrated into one housing. Their principle of operation does not differ from other CES systems. The safety switches are also available in unicode, multicode and fixcode versions. The advantage compared to evaluation with a separate evaluation unit is in the combination of the complete switch function in one compact housing. This feature makes possible decentralized evaluation directly on-site.

Approvals

To demonstrate conformity, the Machinery Directive also includes the possibility of type examination. Although all relevant standards are taken into account during development, we subject all our switches to additional type examinations by a notified body.
Many of the devices listed in this catalog have been tested by the German Social Accident Insurance association (DGUV), formerly the employers' liability insurance association (BG), and are given in the lists from the DGUV. Furthermore, numerous devices are listed by Underwriters Laboratories (UL). These devices can be used in countries in which this listing is required. The approval symbols on the individual pages of the catalog indicate which body tested the switchgear.
With the aid of the approval symbols listed below you can quickly see which approvals are available for the related devices:

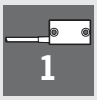
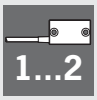
DGUV Test ET Sicherheit geprüft tested safety	Devices with this symbol have the approval of the German Social Accident Insurance association (DGUV) – formerly the employers' liability insurance association (BG)
c UL us LISTED	Devices with this symbol are approved by Underwriters Laboratories (UL, Canada and USA)

System families at a glance

System family	Interlocking	Guard locking	Guard lock monitoring	Monitored Start button	Feedback loop	Switch chain	Short circuit monitoring (own clock signal)	External clock signals allowed
Safety system CES-AZ-...	●	●	●	●	●			●
Safety system CES-FD-...	●						●	
Safety switch CES-A-.5-...	●							●
Safety switch CES-AH-...	●			●	●			
Safety switches CES-AP-...	●						●	
Safety switches CET-AP-...	●	●	●	●	●			
Safety switches CES-AR-...	●					Max. 20 devices	●	
Safety switches CET-AR-...	●	●	●	●	●			
Key to symbols	●	Option available						

Explanation of symbols

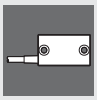
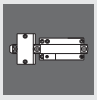
Connection options

	1 read head can be connected
	1 ... 2 read heads can be connected
	1 ... 4 read heads can be connected
	1 ... 20 safety switches can be connected in series

Safety category/guard locking

	Suitable up to category 3 or Performance Level d in accordance with EN ISO 13849-1
	Suitable up to category 3 or Performance Level e in accordance with EN ISO 13849-1
	Suitable for categories 3 and 4 or Performance Level e in accordance with EN ISO 13849-1
	Suitable up to category 4 or Performance Level e in accordance with EN ISO 13849-1
	Guard locking for process protection
	Guard locking for personal protection

Components

	Evaluation unit
	Read head CES
	Read head CEM with mounting magnet
	Actuator CES
	Actuator CEM
	Bolt
	Read head/safety switch CET with guard locking
	Connection cables

Housings

	Housing, here: C01

Plug connectors

	Plug connector design, here: M8
	Number of plug connector pins, here: 5-pin

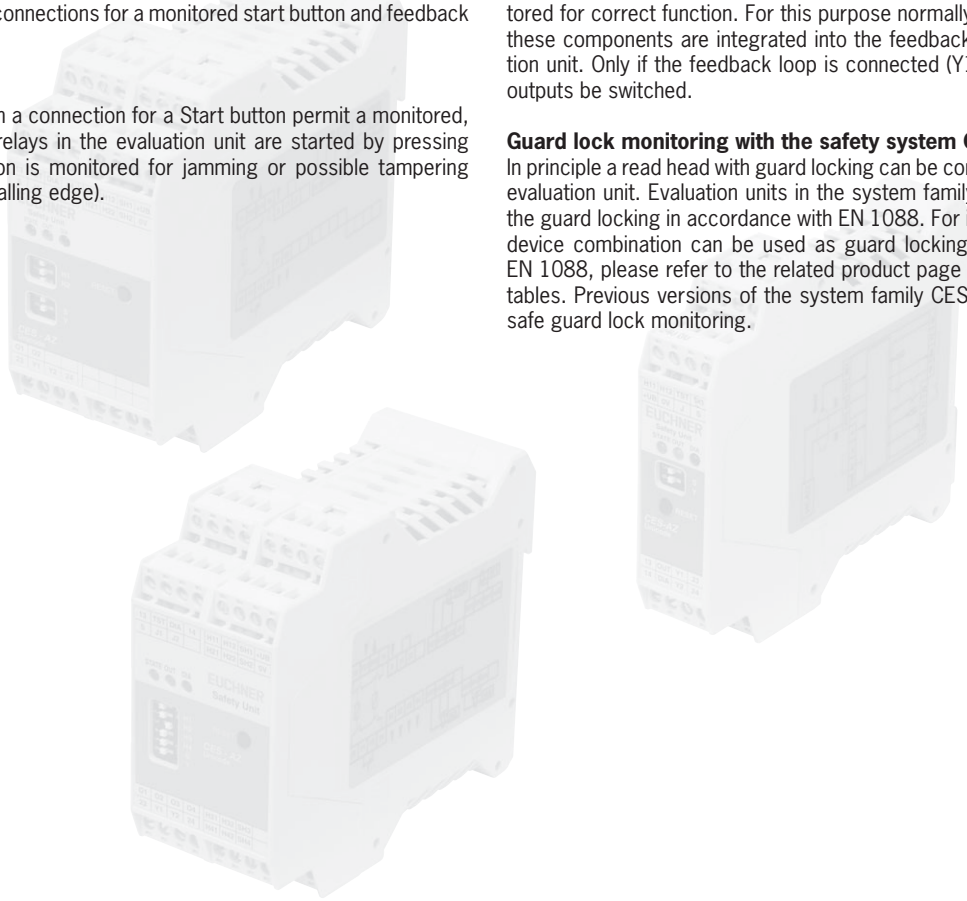
Miscellaneous

	Overview with important information

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 additional monitoring outputs, 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 relays in the evaluation unit are started by pressing a button. The button is monitored for jamming or possible tampering (monitoring of the falling edge).



Feedback loop
Components connected downstream of the evaluation unit 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. Only if the feedback loop is connected (Y1/Y2) can the safety outputs be switched.

Guard lock monitoring with the safety system CES-AZ...
In principle a read head with guard locking can be connected to each CES evaluation unit. 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 related product page and the combination tables. Previous versions of the system family CES-A-... do not provide safe guard lock monitoring.

Evaluation units

CES-AZ-AES-01B / CES-AZ-UES-01B
- 1 read head
- Category 4 according to EN ISO 13849-1
- PL e according to EN ISO 13849-1
- Available in the unicode and multicode variants

(see page 14)

CES-AZ-AES-02B / CES-AZ-UES-02B
- Up to 2 read heads
- Category 4 according to EN ISO 13849-1
- PL e according to EN ISO 13849-1
- Available in the unicode and multicode variants

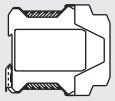
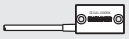
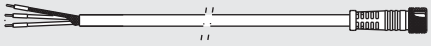
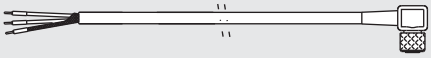
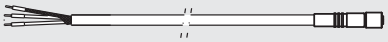
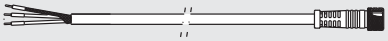
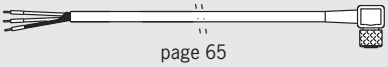
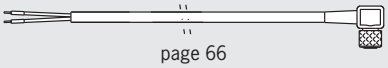
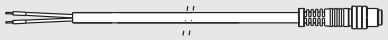
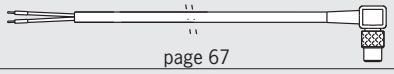
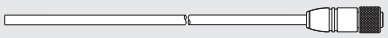
(see page 16)

CES-AZ-AES-04B / CES-AZ-UES-04B
- Up to 4 read heads
- Category 4 according to EN ISO 13849-1
- PL e according to EN ISO 13849-1
- Available in the unicode and multicode variants

(see page 18)

Read heads	Guard locking	Actuators
 **CES-A-LSP-..** ▸ Opt. for aluminum profile mounting ▸ PVC connection cable (see page 20)	No	 **CES-A-BSP** ▸ Optimized for aluminum profile mounting (see page 30)
CES-A-LSP-SB ▸ Opt. for aluminum profile mounting ▸ M5 plug connector (see page 20)	No	
 **CES-A-LNN-...** ▸ Cube-shaped ▸ PVC connection cable (see page 22)	No	 **CES-A-BBN** ▸ Cube-shaped (see page 31)
CES-A-LNN-SC ▸ Cube-shaped ▸ M8 plug connector (see page 22)	No	 **CES-A-BDN** ▸ Cylindrical design ∅ 6 mm (see page 32)
 **CES-A-LNA-...** ▸ Cube-shaped ▸ PVC or PUR connection cable (see page 24)	No	 **CES-A-BBA** ▸ Cube-shaped (see page 33)
 **CES-A-LCA-...** ▸ Cube-shaped ▸ Seal included ▸ PVC connection cable (see page 24)	No	 **CES-A-BCA** ▸ Cube-shaped ▸ Seal included (see page 33)
 **CES-A-LNA-SC** ▸ Cube-shaped ▸ M8 plug connector (see page 24)	No	 **CES-A-BDA** ▸ Round design ∅ 20 mm (see page 35)
 **CES-A-LQA-SC** ▸ Cube-shaped ▸ M8 plug connector ▸ For large center offset (see page 26)	No	 **CES-A-BQA** ▸ Cube-shaped ▸ For large center offset (see page 34)
 **CES-A-LMN-SC** ▸ Cylindrical design M12 ▸ M8 plug connector (see page 28)	No	 **CES-A-BMB** ▸ Cylindrical design M12 (see page 36)
 **CKS-A-L1B-SC-113130** ▸ Key adapter for installation in control panels ▸ M8 plug connector (see page 40)	No	 **CKS-A-BK1-RD-113461** ▸ Key for key adapter CKS (see page 40)
 **CEM-A-LE05...** ▸ With and without remanence ▸ Adjustable adhesive force (optional) (see pages 46 - 49)		 **CEM-A-BE05** ▸ Locking force 500 N (see page 52)
 **CEM-A-LH10...** ▸ With and without remanence (see page 50)		 **CEM-A-BH10** ▸ Locking force 1,000 N (see page 53)
 **CET-AX-...** ▸ M12 plug connector (see page 58)		 **CET-A-BWK-50X** ▸ Locking force 6,500 N (see page 58)

Component overview for the non-contact safety system CES-AZ...

Evaluation units	Connection cable	Read heads	Actuators	Bolts
 Pages 14 - 19	Connection cable hard wired to the read head	CES-A-LSP-...  page 20	CES-A-BSP  page 30	-
		CES-A-LNN-...  page 22	CES-A-BBN  page 31 CES-A-BDN page 32	
		CES-A-LNA-...  page 24	CES-A-BBA  page 33 CES-A-BCA  page 33 CES-A-BDA  page 35	page 226/227
		CES-A-LCA-...  page 26		
	 page 65	CES-A-LNA-SC  page 24		
	 page 65	CES-A-LQA-SC  page 26	CES-A-BQA  page 34	-
		CES-A-LMN-SC  page 28	CES-A-BMB  page 36	
		CES-A-LNN-...  page 22	CES-A-BBN  page 31 CES-A-BDN page 32	
		CKS-A-L1B-SC-113130  page 40	CKS-A-RD-113461  page 40	
	 page 64	CES-A-LSP-...  page 20	CES-A-BSP  page 30	
	Evaluation unit  page 65  page 65 Solenoid operating voltage  page 66  page 66	CEM-A-LE05...  Pages 46 - 49	CEM-A-BE05  page 52	page 228
	LED indicator  page 67  page 67	CEM-A-LH10...  page 50	CEM-A-BH10  page 53	-
	Connection cable CET-AX  page 65/66/68	CET.-AX-...  page 58	CET-A-BWK-50X  page 58	page 235

Possible combinations for CES components

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

- Which read head is allowed to be connected to the related evaluation unit?
- Which actuator can be read by the selected read head?
- 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

Safety system CES-AZ

Evaluation unit	Read head	Actuator											
		CES-A-BSP-104970 104970	**CES-A-BBN-106600** 106600	**CES-A-BDN-06-104730** 104730	**CES-A-BBA** 071840	**CES-A-BCA** 088786	**CES-A-BQA** 098108	**CES-A-BDA** 084720	**CES-A-BMB** 077791	**CKS-A-BK1-RD** 113461	**CEM-A-BE05** 094805	**CEM-A-BH10** 095175	**CET-A-BWK-50X** 096327
CES-AZ-AES-01B 104770 **CES-AZ-AES-02B** 104775 **CES-AZ-AES-04B** 104780 **CES-AZ-UES-01B** 105139 **CES-AZ-UES-02B** 105140 **CES-AZ-UES-04B** 105141	**CES-A-LSP-...** All items	20											
	CES-A-LNN-... All items		20	20									
	CES-A-LCA-... All items				15	15		16					
	CES-A-LNA-... All items				15	15		16					
	CES-A-LQA-SC 095650				15	15	23						
	CES-A-LMN-SC 077790								5				
	CKS-A-L1B-SC 113130									-			
	CEM-A-LE05K-S2 094800 **CEM-A-LE05R-S2** 095792												
	CEM-A-LH10K-S3 095170 **CEM-A-LH10R-S3** 095793												
	CET.-AX-... All items												

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

- **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 13

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

Guard lock monitoring
Evaluation units in the series CES-AZ make it possible to use read heads with integrated guard locking for the protection of personnel during overtraveling machine movements. For suitable read heads, please refer to the combination table on page 13.

Category according to EN ISO 13849-1
Due to two redundant safety paths (relay contacts) with 2 internal, monitored normally open contacts per safety path, suitable for:
- Category 4 / PL e according to EN ISO 13849-1

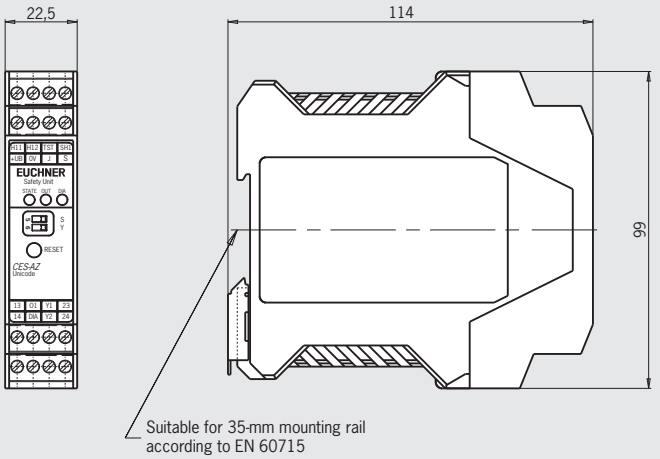
Each safety path is independently safe.

LED indicator
STATE Status LED
DIA Diagnostics LED
OUT Safety output status

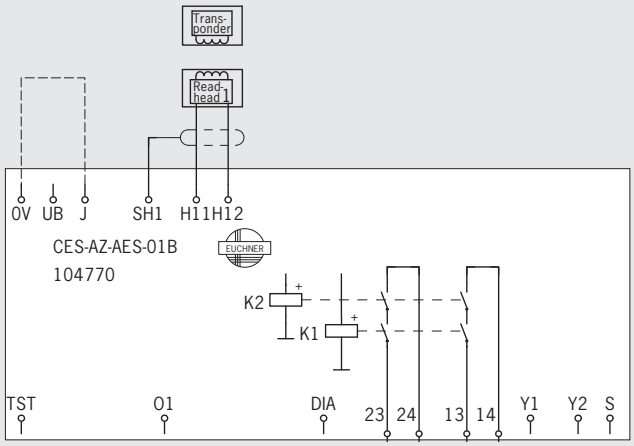
Additional connections
TST Input for self-test
O1 Monitoring output (semiconductor)
DIA Diagnostics output
Y1, Y2 Feedback loop
S Start button connection (monitoring of the falling edge)

Evaluation unit CES-AZ-AES-01B — Cat. 4 / PLe / 1

Dimension drawing



Block diagram



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

Ordering table

Series	Category and PL acc. to EN ISO 13849-1	Number of read heads	Version	Order no./item
CES-AZ-AES-01B Unicode	Up to 4 / PL e	1		**104770** CES-AZ-AES-01B
CES-AZ-UES-01B Multicode	Up to 4 / PL e	1		**105139** CES-AZ-UES-01B
Connection sets for evaluation unit CES-AZ-…-01B			Plug-in screw terminals	**104756** CES-EA-TC-AK04-104756
			Plug-in spring terminals	**112631** CES-EA-TC-KK04-112631

Technical data for 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
Mass		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		
Mounting		Mounting rail 35 mm according to EN 60715		
Number of read heads		1 read head per evaluation unit		
Connection (plug-in screw terminals/coded)	0.14	-	2.5	mm²
Operating voltage U_B (regulated, residual ripple < 5%)	21	24	27	V DC
For the approval according to cULus the following applies		Operation only with UL class 2 power supply, 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)				
- 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	-	2,000	
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 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 4A / DC-12 30V 4A AC-15 230V 2A / DC-13 24V 3A		
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		according to 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 both 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 acc. to EN IEC 60947-5-3		≤ 10		%
Monitoring outputs (diagnostics DIA, door monitoring contact 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		according to EN 60947-5-3		
Reliability values 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 [6]		
Performance Level (PL)		e		
PFH_d		1.9×10^{-8} [6]		
Mission time		20		years
Number of switching cycles/year	760,000	153,000	34,600	

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 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.
6) The value may be lower depending on the read head connected. See notes for the related read head.

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 13

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

Guard lock monitoring
Evaluation units in the series CES-AZ make it possible to use read heads with integrated guard locking for the protection of personnel during overtraveling machine movements. For suitable read heads, please refer to the combination table on page 13.

Category according to EN ISO 13849-1
Due to two redundant safety paths (relay contacts) with 2 internal, monitored normally open contacts per safety path, suitable for:
- Category 4 / PL e according to EN ISO 13849-1

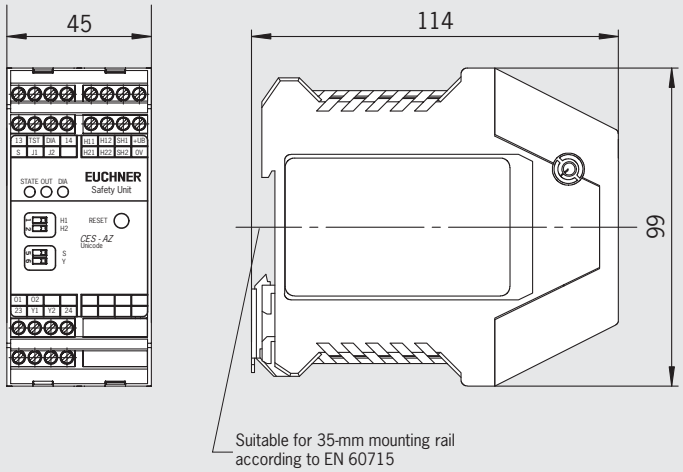
Each safety path is independently safe.

LED indicator
STATE Status LED
DIA Diagnostics LED
OUT Safety output status

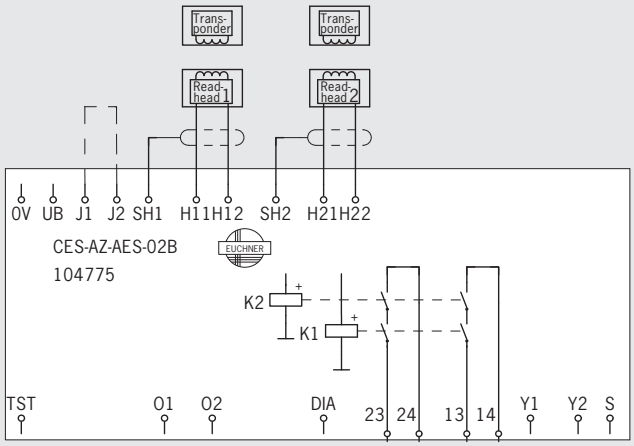
Additional connections
TST Input for self-test
O1, O2 Monitoring outputs (semiconductor)
DIA Diagnostics output
Y1, Y2 Feedback loop
S Start button connection (monitoring of the falling edge)

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

Dimension drawing



Block diagram



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

Ordering table

Series	Category and PL acc. to EN ISO 13849-1	Number of read heads	Version	Order no./item
CES-AZ-AES-02B Unicode	Up to 4 / PL e	2		**104775** CES-AZ-AES-02B
CES-AZ-UES-02B Multicode	Up to 4 / PL e	2		**105140** CES-AZ-UES-02B
Connection sets for evaluation unit CES-AZ-…-02B			Plug-in screw terminals	**104771** CES-EA-TC-AK06-104771
			Plug-in spring terminals	**112630** CES-EA-TC-KK06-112630

Technical data for 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
Mass		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		
Mounting		Mounting rail 35 mm according to EN 60715		
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 only with UL class 2 power supply, 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	-	6,000	
- at switching voltage AC 5 … 230 V	10	-	2,000	
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 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		
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		according to 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 both 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 acc. to EN IEC 60947-5-3		≤ 10		%
Monitoring outputs (diagnostics DIA, enable 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		according to EN 60947-5-3		
Reliability values 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 [6]		
Performance Level (PL)		e		
PFH_d		1.9×10^{-8} [6]		
Mission time		20		years
Number of switching cycles/year	760,000	153,000	34,600	

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.
6) The value may be lower depending on the read head connected. See notes for the related read head.

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 13

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

Guard lock monitoring
Evaluation units in the series CES-AZ make it possible to use read heads with integrated guard locking for the protection of personnel during overtraveling machine movements. For suitable read heads, please refer to the combination table on page 13.

Category according to EN ISO 13849-1
Due to two redundant safety paths (relay contacts) with 2 internal, monitored normally open contacts per safety path, suitable for:
- Category 4 / PL e according to EN ISO 13849-1

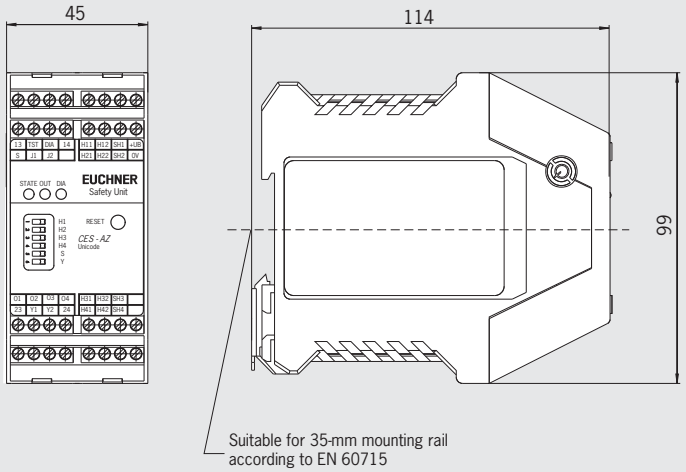
Each safety path is independently safe.

LED indicator
STATE Status LED
DIA Diagnostics LED
OUT Safety output status

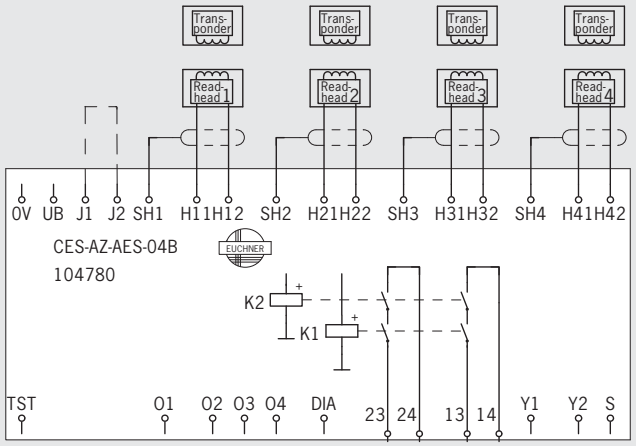
Additional connections
TST Input for self-test
O1...O4 Monitoring outputs (semiconductor) (p- or n-switching, see ordering table)
DIA Diagnostic output (p- or n-switching, see ordering table)
Y1, Y2 Feedback loop
S Start button connection (monitoring of the falling edge)

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

Dimension drawing



Block diagram



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

Ordering table

Series	Category and PL acc. to EN ISO 13849-1	Number of read heads	Version	Order no./item
CES-AZ-AES-04B Unicode	Up to 4 / PL e	4	Monitoring outputs p-switching	**104780** CES-AZ-AES-04B
CES-AZ-ALS-04B Unicode	Up to 4 / PL e	4	Monitoring outputs n-switching	**113090** [1] CES-AZ-ALS-04B
CES-AZ-UES-04B Multicode	Up to 4 / PL e	4	Monitoring outputs p-switching	**105141** CES-AZ-UES-04B
Connection sets for evaluation unit CES-AZ-...-04B			Plug-in screw terminals	**104776** CES-EA-TC-AK08-104776
			Plug-in spring terminals	**112629** CES-EA-TC-KK08-112629

1) No UL or German Social Accident Insurance approval

Technical data for 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
Mass		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		
Mounting		Mounting rail 35 mm according to EN 60715		
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 only with UL class 2 power supply, 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)				mA
- at switching voltage AC/DC 21 … 60 V	1	-	300	
- at switching voltage AC/DC 5 … 30 V	10	-	6,000	
- at switching voltage AC 5 … 230 V	10	-	2,000	
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 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		
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		according to EN 60947-5-2		
Mechanical operating cycles (relays)		10×10^6		
Switching delay from state change [2]				ms
- 4 activated actuators	-	-	450	
- 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				ms
- Duration of operation of start button	250	-	-	
- 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 acc. to EN IEC 60947-5-3		≤ 10		%
Monitoring outputs (diagnostics DIA, enable 01…04, semiconductor output, p- or n-switching depending on version, short circuit-protected)				
- Output voltage (only p-switching)	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	20	mA
Start button input S, test input TST				V DC
- Input voltage LOW	0	-	2	
HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
EMC protection requirements		according to EN 60947-5-3		
Reliability values 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 [6]		
Performance Level (PL)		e		
PFH_d		1.9×10^{-8} [6]		
Mission time		20		years
Number of switching cycles/year	760,000	153,000	34,600	

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.
6) The value may be lower depending on the read head connected. See notes for the related read head.

Read head CES-A-LSP-...

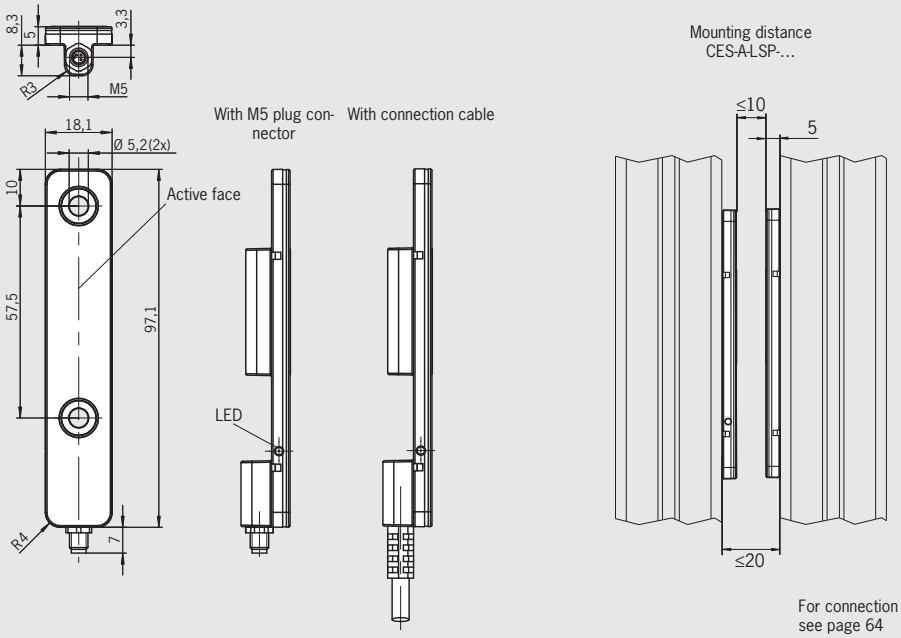
- **Optimized for aluminum profile mounting**
- **LED for the indication of the door position**

For possible combinations see page 13

Important:
Actuators must be ordered separately! See page 30.

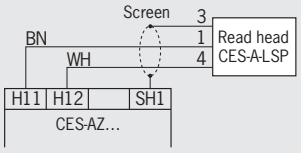
Read head CES-A-LSP-...
M5 plug connector, 3-pin, or hard-wire encapsulated cable

Dimension drawing

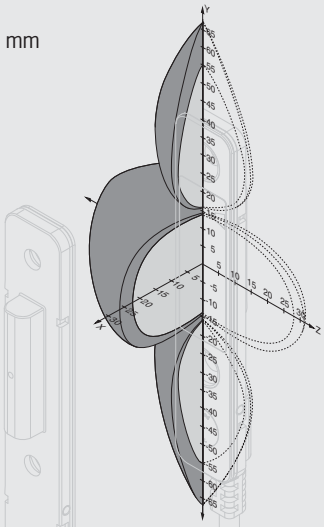


For connection cable see page 64

Terminal assignment



Typical operating distance
Installed in aluminum profile 45 x 45 mm



Ordering table

Series	Cable type/connection type/version	Cable length [m]/description	Order no./item
CES-A-LSP-...	**V** PVC cable	5	**104966** CES-A-LSP-05V-104966
		10	**104967** CES-A-LSP-10V-104967
	SB M5 plug connector	-	**104969** CES-A-LSP-SB-104969
Installation material for CES-A-LSP-...	For Bosch profiles with 8 mm groove	2 screws and 2 clamping pieces	**106633** Installation material 8-groove Bosch
	For Bosch profiles with 10 mm groove	2 screws and 2 clamping pieces	**106634** Installation material 10-groove Bosch
	For ITEM profiles with 8 mm groove	2 screws and 2 clamping pieces	**106635** Installation material 8-groove ITEM

Technical data for read head CES-A-LSP-...

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced thermoplastic, fully encapsulated			
Mass (without connection cable)	0.02			kg
Ambient temperature	-25	-	+70	°C
Degree of protection	IP67			
Installation position	Any			
Method of operation	Inductive			
Power supply	Via evaluation unit			
Connection	M5 plug connector, 3-pin			
LED indicator	White, valid actuator detected			
Cable length	-	-	25	m
In combination with actuator CES-A-BSP-104970				
Operating distance for center offset m = 0 [1]				
with vertical approach direction (x direction)				
- Assured switch-off distance S_{ar}	-	-	45	
Cable length l = 0 to 25 m				mm
- Switch-on distance	-	20	-	
- Assured switch-on distance S_{ao}	10	-	-	
- Switching hysteresis	1	4	-	

1) These values apply to the installation of the read head and the actuator in an aluminum profile 45 x 45 mm.

Read head CES-A-LNN-...

- **Cube-shaped design 42 x 25 mm**
- **Attachment compatible with series CES-A-LNA/LCA**
- **LED for the indication of the door position**

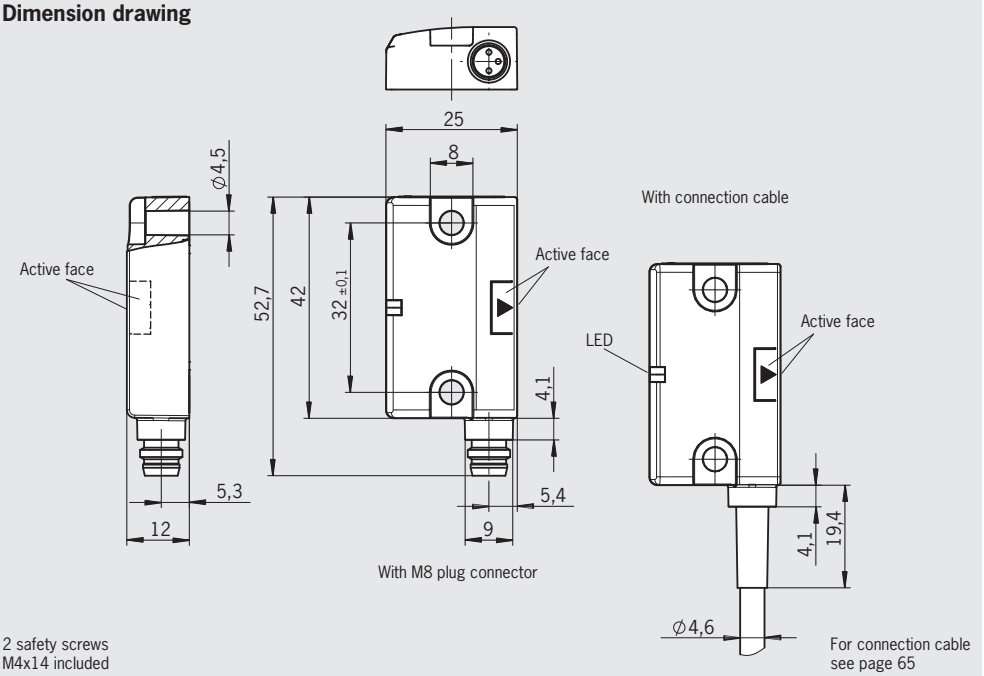
For possible combinations see page 13

Attention:
The operating distance may vary depending on the substrate material and installation situation.

Important:
Actuators must be ordered separately! See page 31.

Read head CES-A-LNN-...
M8 plug connector, 3-pin, or hard-wire encapsulated cable

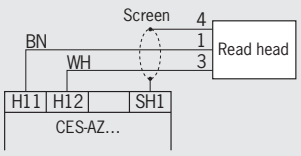
Dimension drawing



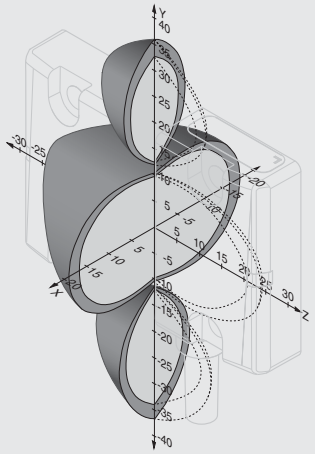
2 safety screws M4x14 included

For connection cable see page 65

Terminal assignment

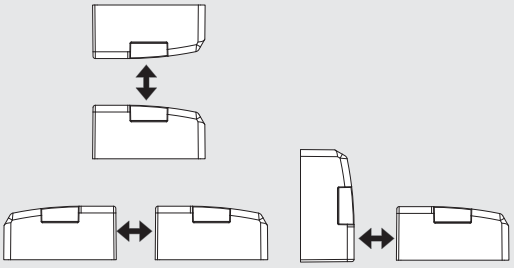


Typical operating distance



For a side approach direction for the actuator and read head, a minimum distance of s = 6 mm must be maintained so that the operating distance of the side lobes is not entered.

Approach directions



Ordering table

Series	Cable type/connection type	Cable length [m]	Order no./item
CES-A-LNN-...	**V** PVC cable	5	**106602** CES-A-LNN-05V-106602
		10	**113294** CES-A-LNN-10V-113294
		25	**115107** CES-A-LNN-25V-115107
	SC M8 plug connector	-	**106601** CES-A-LNN-SC-106601

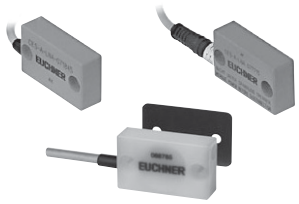
Technical data for read head CES-A-LNN-...

Parameter		Value min.	Value typ.	Value max.	Unit
Housing material			Reinforced thermoplastic (PBT), fully encapsulated		
Dimensions			42 x 25 x 12		mm
Mass (without connection cable)			0.025		kg
Ambient temperature		-25	-	+70	°C
Degree of protection			IP67		
Installation position			Any		
Method of operation			Inductive		
Power supply			Via evaluation unit		
Connection			M8 plug connector, 3-pin, or connection cable		
LED indicator			White, valid actuator detected		
Cable length		-	-	25	m
In combination with actuator CES-A-BBN-106600					
Operating distance for center offset m = 0 [1]					
- Assured switch-off distance S_{ar}	in x/z direction	-	-	50	
	in y direction	-	-	80	
Cable length l = 0 to 25 m					mm
- Switch-on distance		-	20	-	
- Assured switch-on distance S_{ao}		10	-	-	
- Switching hysteresis		1	4	-	
In combination with actuator CES-A-BDN-06-104730					
Operating distance for center offset m = 0					
- Assured switch-off distance S_{ar}	in x/z direction	-	-	50	
	in y direction	-	-	80	
Cable length l = 0 to 25 m					mm
- Switch-on distance		-	19	-	
- Assured switch-on distance S_{ao}		14	-	-	
- Switching hysteresis		-	4	-	

1) These values apply to the surface installation of the read head and the actuator.

Read head CES-A-LC.../CES-A-LN...

- **Cube-shaped design 42 x 25 mm**

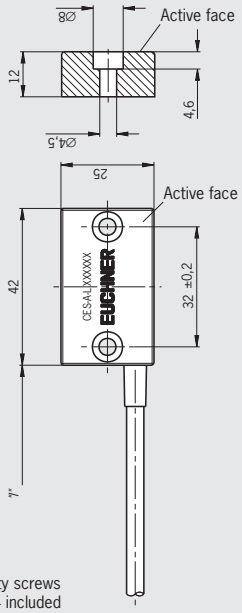


For possible combinations see page 13

Attention:
The operating distance may vary depending on the substrate material and installation situation.

Important:
Actuators must be ordered separately! See page 33 and 35.

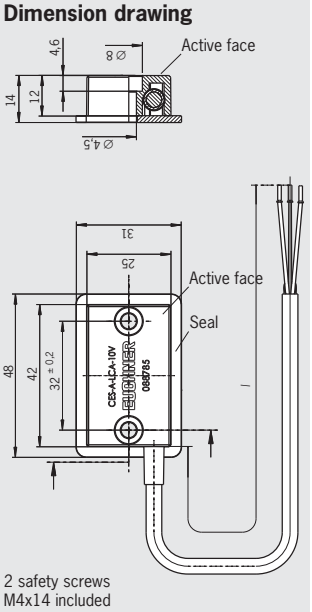
Read head CES-A-LNA... (Fortron)
Hard-wired encapsulated cable



2 safety screws M4x14 included

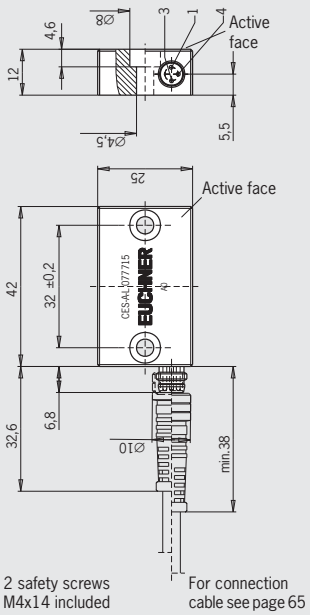
Read head CES-A-LCA... (PE-HD)
Hard-wired encapsulated cable

Dimension drawing



2 safety screws M4x14 included

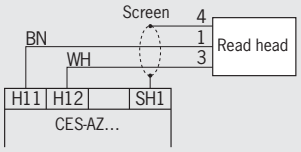
Read head CES-A-LNA-SC (Fortron)
M8 plug, 3-pin



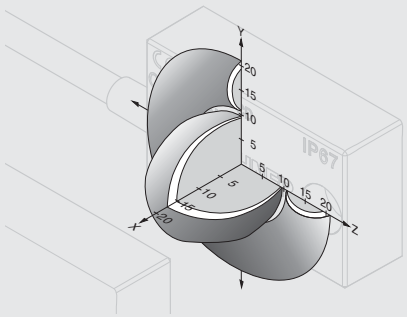
2 safety screws M4x14 included

For connection cable see page 65

Terminal assignment



Typical operating distance



For a side approach direction for the actuator and read head, a minimum distance of s = 3 mm must be maintained so that the operating distance of the side lobes is not entered.

Ordering table

Series	Cable type/connection type	Cable length [m]	Version	Order no./item
CES-A-LCA-...	**V** PVC cable	10	Housing material PE-HD [1]	**088785** CES-A-LCA-10V
CES-A-LNA-...	**V** PVC cable	5		**071845** CES-A-LNA-05V
		10		**071846** CES-A-LNA-10V
		15		**071847** CES-A-LNA-15V
		25		**071975** CES-A-LNA-25V
	P PUR cable	5		**077806** CES-A-LNA-05P
		10		**077807** CES-A-LNA-10P
		15		**084682** CES-A-LNA-15P
	SC M8 plug connector	-		**077715** [2] CES-A-LNA-SC

1) Suitable for use in aggressive media (e.g. acids, alkalines)
2) Plug connector suitable for snap-action and screw terminals

Technical data for read head CES-A-LC.../CES-A-LN...

Parameter	Value			Unit
	min.	typ.	max.	
Housing material - CES-A-LNA-...	Fortron, reinforced thermoplastic, fully encapsulated			
- CES-A-LCA-...	Plastic PE-HD without reinforcement, fully encapsulated			
Flat seal material (CES-A-LCA-... only)	Fluoro rubber 75 FPM 4100			
Dimensions	42 x 25 x 12			mm
Mass (incl. 10 m cable)	0.3			kg
Ambient temperature				
- CES-A-LCA-...	-25	-	+50	°C
- CES-A-LNA-...	-25	-	+70	
Degree of protection				
- CES-A-LCA-...	IP67			
- CES-A-LNA-...	IP67/IP69K			
Installation position	Any			
Method of operation	Inductive			
Power supply	Via evaluation unit			
Connection cable - CES-A-LCA-.../CES-A-LNA-... - CES-A-LNA-...	Hard-wired encapsulated connection cable, with cable end sleeves PVC, ∅ 4.6 mm PUR, ∅ 4.8 mm, suitable for drag chain			
- CES-A-LNA-SC	M8 plug connector (snap-action and screw terminals), 3-pin			
Cable length	See ordering table		25	m
In combination with actuator CES-A-BBA				
Operating distance for center offset m = 0 [1]				mm
- Assured switch-off distance S_{ar}	-	-	26	
Cable length l = 0 to 25 m				
- Switch-on distance	-	15	-	
- Assured switch-on distance S_{ao}	10	-	-	
- Switching hysteresis	0.5	2	-	
In combination with actuator CES-A-BDA				
Information about the operating distance is available from our Technical Support department.				

1) These values apply to the surface installation of the read head and the actuator.

Read head CES-A-LQA-SC

- **Cube-shaped design 50 x 50 mm**
- **M8 plug connector (snap-action and screw terminals)**

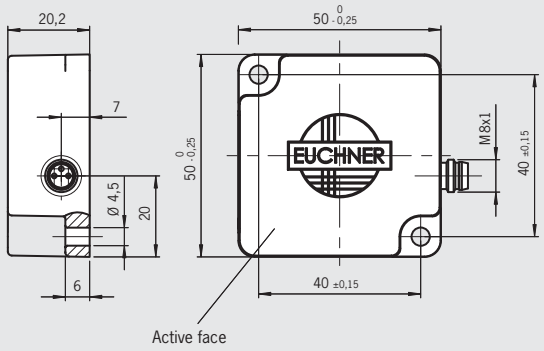
For possible combinations see page 13

Attention:
The operating distance may vary depending on the substrate material and installation situation.

Important:
Actuators must be ordered separately! See page 34.

Read head CES-A-LQA-SC
M8 plug, 3-pin

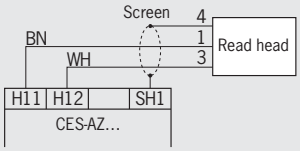
Dimension drawing



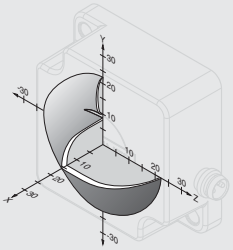
2 safety screws M4x14 included

For connection cable see page 65

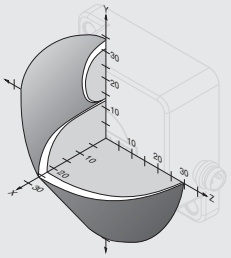
Terminal assignment



Typical operating distance



With actuator CES-A-BBA or CES-A-BCA on evaluation unit CES-AZ



With actuator CES-A-BQA on evaluation unit CES-AZ

Ordering table

Series	Connection	Comment	Order no./item
CES-A-LQA-SC	**SC** M8 plug connector	2 safety screws M4 x 14 included	**095650** CES-A-LQA-SC

Technical data for read head CES-A-LQA-SC

Parameter	Value			Unit
	min.	typ.	max.	
Housing material		Fortron, reinforced thermoplastic, fully encapsulated		
Dimensions		50 x 50 x 20.2		mm
Mass		0.08		kg
Ambient temperature	-25	-	+70	°C
Degree of protection		IP67		
Installation position		Any		
Method of operation		Inductive		
Power supply		Via evaluation unit		
Cable length	-	-	25	m
In combination with actuator CES-A-BBA or CES-A-BCA on evaluation unit CES-AZ				
Operating distance for center offset m = 0 [1]				mm
- Assured switch-off distance S_{ar}	-	-	47	
Cable length l = 0 to 25 m				
- Switch-on distance	-	15	-	
- Assured switch-on distance S_{ao}	10	-	-	
- Switching hysteresis	2	3	-	
In combination with actuator CES-A-BQA on evaluation unit CES-AZ				
Operating distance for center offset m = 0 [1]				mm
Cable length l = 0 to 25 m				
- Assured switch-off distance S_{ar}	-	-	60	
For vertical approach direction				
- Switch-on distance	-	23	-	
- Assured switch-on distance S_{ao}	16	-	-	
- Switching hysteresis	2	3	-	
For side approach direction				
- Switch-on distance	-	28	-	
- Assured switch-on distance S_{ao}	24	-	-	
- Switching hysteresis	1	1.3	-	

1) These values apply to the surface installation of the read head and the actuator.

Read head CES-A-LMN-SC

- **Cylindrical design M12**
- **M8 plug connector (snap-action and screw terminals)**

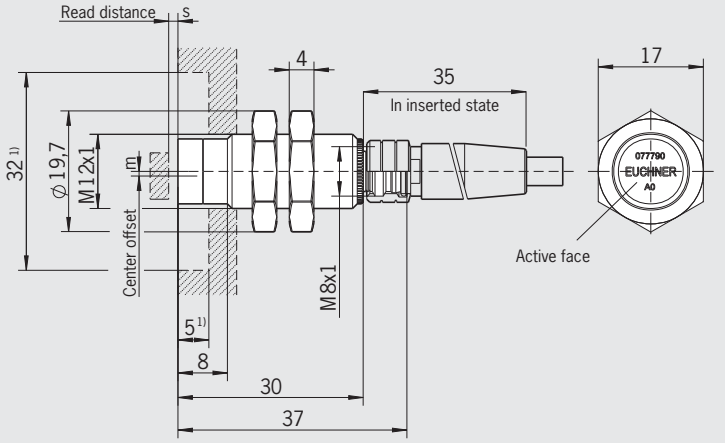
For possible combinations see page 13

Attention:
The operating distance may vary depending on the substrate material and installation situation.

Important:
Actuators must be ordered separately! See page 36.

Read head CES-A-LMN-SC
M8 plug, 3-pin

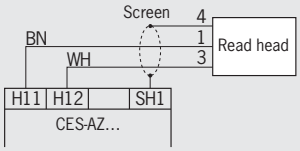
Dimension drawing



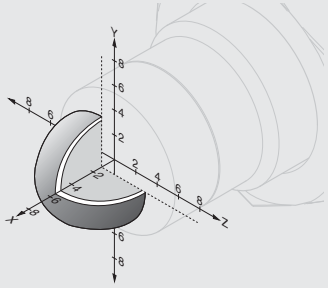
1) Metal-free zone

For connection cable see page 65

Terminal assignment



Typical operating distance



A minimum distance of s = 1.2 mm must be maintained.

Ordering table

Series	Connection	Version	Order no./item
CES-A-LMN-SC	**SC** M8 plug connector	Housing M12	**077790** CES-A-LMN-SC

Technical data for read head CES-A-LMN-SC

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Nickel-plated CuZn housing sleeve Plastic PBT GF20 cap			
Dimensions	M12 x 1, length 38			mm
Mass	0.2			kg
Ambient temperature				°C
- CES-A-LMN-SC	-20	-	+70	
Ambient pressure (only of active face in installed condition)	-	-	10	bar
Degree of protection	IP67			
Installation position	Any			
Method of operation	Inductive			
Power supply	Via evaluation unit			
Cable length	-	-	15	m
In combination with actuator CES-A-BMB				
Operating distance for center offset m = 0 [1]				mm
- Assured switch-off distance S_{ar}	-	-	10	
Cable length l = 0 to 15 m				
- Switch-on distance	-	5	-	
- Assured switch-on distance S_{ao}	3.5	-	-	
- Switching hysteresis	0.1	0.3	-	
Connection	M8 plug connector (snap-action and screw terminals), 3-pin			

1) These values apply to surface installation of the read head in steel.

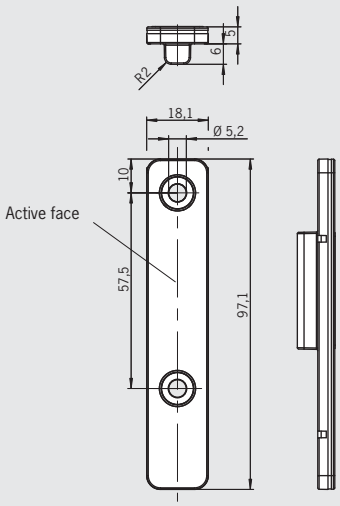
Actuator CES-A-BSP

- **Optimized for aluminum profile mounting**

For possible combinations see page 13

Actuator CES-A-BSP

Dimension drawing



Ordering table

Series	Comment	Version	Order no./item
CES-A-BSP	Please order installation material separately		**104970** CES-A-BSP-104970
Installation material for CES-A-BSP	For Bosch profiles with 8 mm groove	2 screws and 2 clamping pieces	**106633** Installation material 8-groove Bosch
	For Bosch profiles with 10 mm groove	2 screws and 2 clamping pieces	**106634** Installation material 10-groove Bosch
	For ITEM profiles with 8 mm groove	2 screws and 2 clamping pieces	**106635** Installation material 8-groove ITEM

Technical data

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced thermoplastic, fully encapsulated			
Mass	0.02			kg
Ambient temperature	-25	-	+70	°C
Degree of protection	IP67			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

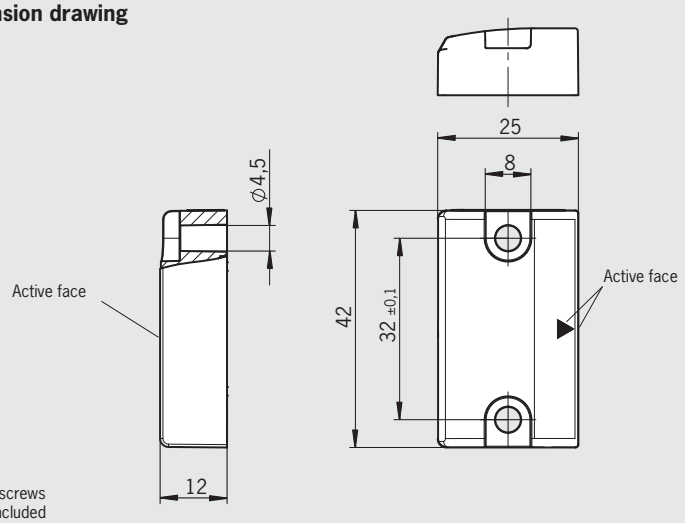
Actuator CES-A-BBN

- **Cube-shaped design 42 x 25 mm**
- **Attachment compatible with actuator CES-A-BBA/BCA**

For possible combinations see page 13

Actuator CES-A-BBN

Dimension drawing



Ordering table

Series	Comment	Version	Order no./item
CES-A-BBN	2 safety screws M4 x 14 included		**106600** CES-A-BBN-106600

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	Reinforced thermoplastic (PBT), fully encapsulated			
Dimensions	42 x 45 x 12			mm
Mass	0.025			kg
Ambient temperature	-25	-	+70	°C
Degree of protection	IP67			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

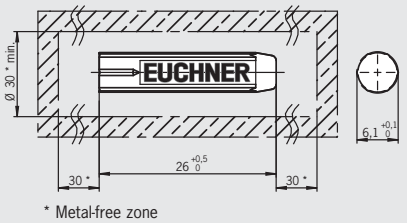
Actuator CES-A-BDN-06

- **Cylindrical design ∅ 6 mm**

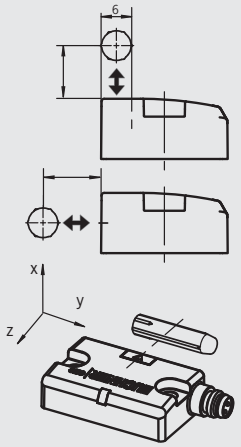
For possible combinations see page 13

Actuator CES-A-BDN-06

Dimension drawing



Installation options



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 ∅ 6		mm
Mass		0.005		kg
Ambient temperature	-40	-	+70	°C
Degree of protection		IP67/IP69K		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

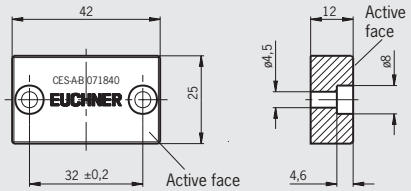
Actuator CES-A-BBA/CES-A-BCA

- **Cube-shaped design**
  42 x 25 mm

For possible combinations see page 13

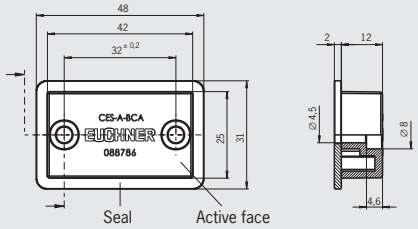
Actuator CES-A-BBA (Fortron)

Dimension drawing



2 safety screws
M4x14 included

Actuator CES-A-BCA (PE-HD)
Housing material PE-HD



2 safety screws
M4x14 included

Ordering table

Series	Comment	Version	Order no./item
CES-A-BBA	2 safety screws M4 x 14 included	-	**071840** CES-A-BBA
CES-A-BCA	2 safety screws M4 x 14 included Flat seal included	Housing material PE-HD [1]	**088786** CES-A-BCA

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

Technical data

Parameter	Value min.	Value typ.	Value 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)	Fluoro rubber 75 FPM 4100			
Dimensions	42 x 25 x 12			mm
Mass	0.02			kg
Ambient temperature				°C
- CES-A-BBA	-25	-	+70	
- CES-A-BCA	-25	-	+50	
Degree of protection	IP67/IP69K			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

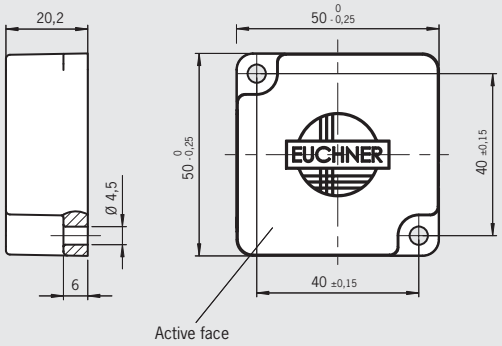
Actuator CES-A-BQA

- **Cube-shaped design**
  50 x 50 mm

For possible combinations see page 13

Actuator CES-A-BQA

Dimension drawing



2 safety screws
M4x14 included

Ordering table

Series	Comment	Version	Order no./item
CES-A-BQA	2 safety screws M4 x 14 included		**098108** CES-A-BQA

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	Fortron, reinforced thermoplastic, fully encapsulated			
Dimensions	50 x 50 x 20.2			mm
Mass	0.07			kg
Ambient temperature	-25	-	+70	°C
Degree of protection	IP67			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

Actuator CES-A-BDA

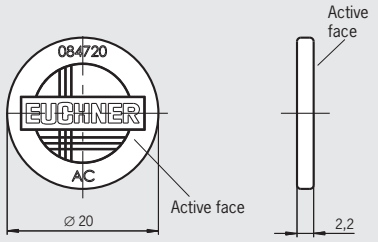
- **Round design ∅ 20 mm**

For possible combinations see page 13

Attention:
The operating distance decreases in case of flush installation in metal.
Flush installation in aluminum is not permissible.

Actuator CES-A-BDA

Dimension drawing



Ordering table

Series	Comment	Version	Order no./item
CES-A-BDA			**084720** CES-A-BDA-20

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic PC		
Dimensions		∅ 20 x 2.2		mm
Mass		0.0008		kg
Ambient temperature	-25	-	+70	°C
Degree of protection		IP67		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

Actuator CES-A-BMB

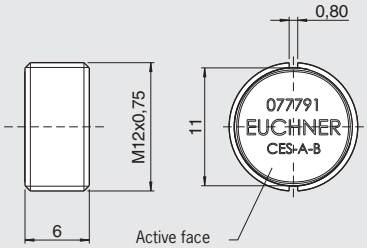
- **Cylindrical design M12 x 0.75**

For possible combinations see page 13

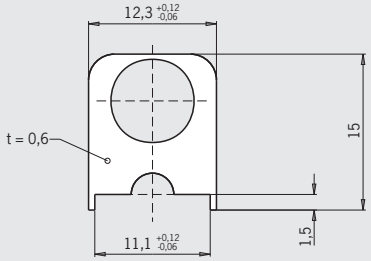
Insertion tool
With the aid of the insertion tool, the actuator CES-A-BMB (cylindrical design) can be screwed into a prepared M12 x 0.75 thread in the safety door.

Actuator CES-A-BMB

Dimension drawing



Insertion tool



Ordering table

Series	Comment	Version	Order no./item
CES-A-BMB			**077791** CES-A-BMB
Insertion tool		For actuator CES-A-BMB	**037662**

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	Stainless steel			
Dimensions	M12 x 0.75, depth 6			mm
Mass	0.002			kg
Ambient temperature	-25	-	+70	°C
Ambient pressure (only applies if the pressure acts on all sides of the actuator)	-	-	10	bar
Degree of protection	IP67			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

Key adapter CKS – safe entry into installations

- **Starting dangerous machine movements is not possible when the key is withdrawn**
- **Suitable for the highest safety requirements: Cat. 4 / PL e**
- **Every key is unique**
- **High protection against tampering**

The new CKS is a transponder-technology-based system consisting of a uniquely coded key, a key adapter and a CES evaluation unit. Thanks to its compact, robust design and its high degree of protection (IP67), the CKS is suitable for industrial use. The functional principle of the CKS couldn't be simpler. When the key is inserted in the key adapter, the evaluation unit reads the data from the transformer and checks it for validity.
If the key is recognized, the evaluation unit switches the safety outputs. Therefore, it is possible to start the installation only with a valid key inserted in the key adapter.

Important!

Use as a lockout mechanism is permissible only in combination with unicode evaluation.

The CKS system can thus be used when servicing installations, for example. Before the authorized personnel enters the installation, the CKS key is withdrawn from the key adapter and brought along into the installation. If the safety guard is now closed unintentionally, the installation cannot start. This characteristic allows the CKS to be integrated into overall concepts of installations with the highest safety level (Cat. 4. / PL e).
In addition to use as a lockout mechanism, the CKS system is ideally suited as an electronic key transfer system or for assigning access rights to stop a production process.

Your advantages

- Versatile use, e.g. as a lockout mechanism, authorization for selecting operating modes, key transfer system
- High degree of protection IP 67
- Simple connection via M8 plug connector

Key adapter CKS

- **Key adapter with integrated CES read head**
- **LED indicator**
- **Simple connection via M8 plug connector**
- **High degree of protection IP67**

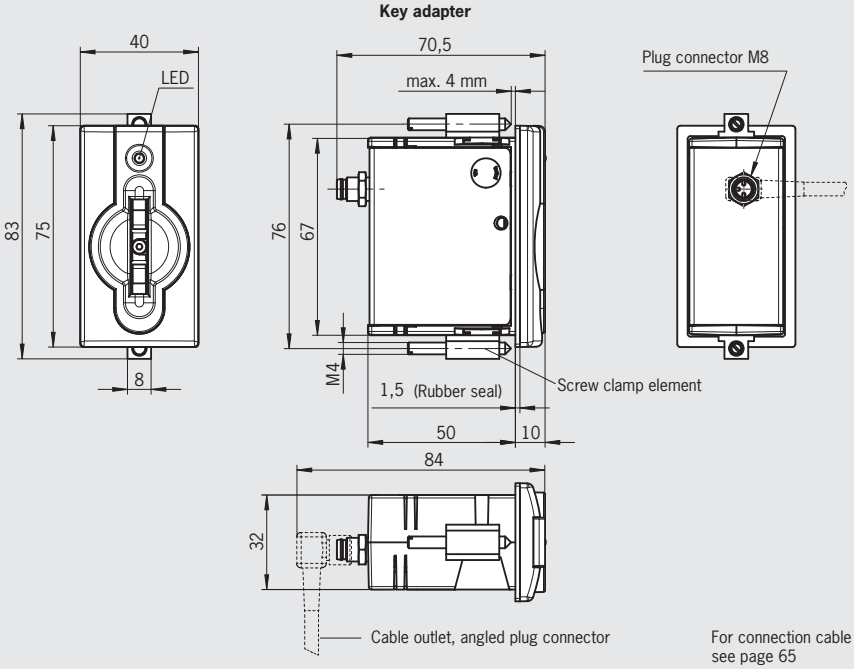
For possible combinations see page 13

Important: Key adapter CKS must not be used as a lockout mechanism in combination with multicode evaluation.

The key is not included with the key adapter and must be ordered separately.

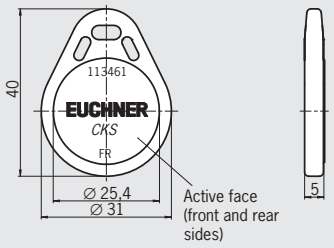
Key adapter CKS

Dimension drawing

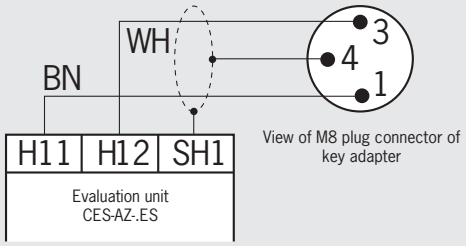


Key CKS

Dimension drawing



Wiring diagram



Ordering table

Series	Version	Order No./item
CKS-A-L1B-SC-113130	Key adapter CKS (including screw clamp elements)	**113130** CKS-A-L1B-SC-113130
CKS-A-BK1-RD-113461	Key CKS (color red)	**113461** CKS-A-BK1-RD-113461

Technical data for key adapter CKS

Parameter	Value min.	Value typ.	Value max.	Unit
Key adapter				
Housing material		Plastic (PA 6 GF30)		
Mass		0.13		kg
Ambient temperature	-20	-	+70	°C
Degree of protection according to IEC 60529		IP67 (in installed state)		
Installation position		On the front		
Mounting cut-out according to DIN 43700		33 x 68		mm
Operating distance [1]				mm
Assured switch-off distance s_{ar}	-	-	30	
Assured switch-on distance s_{ao}	2	-	-	
Switching hysteresis	-	1	-	
Connection to evaluation unit		Plug connector M8 (male socket, 3-pin)		
Cable length	-	-	25	m
LED indicator		white: valid key detected		
Key				
Housing material		Plastic (PC)		
Mass		0.004		kg
Degree of protection according to IEC 60529		IP67		
Ambient temperature	-20	-	+70	°C
Power supply		Inductive via read head		

1) Referred to the stop of the inserted key

Read head CEM with guard locking without guard lock monitoring

- **With transponder coding**
- **Integrated solenoid (without guard lock monitoring)**
- **Up to category 4 / PL e according to EN ISO 13849-1 for monitoring the position of the safety guard**
- **Adjustable adhesive force optional**

Important: The device is only allowed to be used as guard locking if there is no hazard due to overtraveling machine movements. The guard locking is only used for process protection.

Design and functionality
A CES read head and a solenoid are integrated into the CEM read head. The CEM read head is connected to the CES evaluation unit with a round M8 plug connector. The CEM actuator of identical design also has a metal plate in addition to the transponder; this plate acts as an armature for the solenoid coil.
When the safety door is closed, the CEM actuator enters the operating distance of the CEM read head. The transponder signals are transferred, and then the evaluation unit closes the safety contacts and sets the OUT output "high". By applying voltage to the solenoid for the CEM read head, strong magnetic forces can be generated between the coil (in the read head) and the armature (in the actuator).
Depending on the design, locking forces of approx. 500 N or 1,000 N respectively are applied between the CEM actuator and the CEM read head. Practical experience has shown that these magnetic forces effectively prevent any opening, even if the user applies considerable effort.

Use of the read head even in extremely harsh environments
The read heads CEM have an extremely robust design. The high degree of protection IP 67 and the metal housing allow the read head to be used in extremely harsh environments. The armature plate for the CEM actuator has spring mountings and can be tilted up to an angle of ± 4°. Therefore, when a maladjusted safety door is closed, the CEM actuator adjusts itself independently to the surface of the CEM read head. It is not necessary to readjust the safety door when using the read heads CEM. When mounting the read head CEM, it is only necessary to ensure that the CEM actuator is guided in front of the CEM read head when the door is closed, so that the strong adhesive forces can be generated.
Because the read head has only a small number of moving parts which can wear, the mechanical life of the CEM read heads is virtually unlimited.

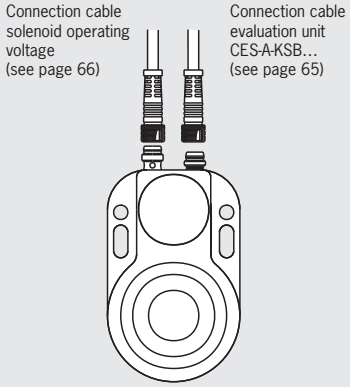
Different versions
EUCHNER provides two CEM housing designs. The two versions differ in their dimensions, according to the size of the solenoid. The safety switch CEM with a locking force of 1,000 N is used with large, heavy safety doors. This read head has an additional M8 plug connector for the connection of an external LED display. When voltage is applied to the coil, it is indicated to the user that the safety door is in the locking position. A display close to the door handle is of advantage particularly for large, massive doors. The smaller version of the read head CEM has a locking force of approx. 500 N. It is suitable for securing smaller safety doors and safety flaps. An LED indicator in the M8 male socket on the read head indicates to the user when voltage is applied to the solenoid.

With or without remanence
In particular during metal machining, the residual magnetism (remanence) in the guard locking solenoid can cause problems. In the open state, metal chips may be drawn to the contact area. The next time the guard is closed, there will be a gap between the actuator and read head that will limit the locking force. To avoid this effect there are read heads without remanence. These are de-magnetized when the safety guard is opened such that metal chips adhering to the surface fall off.

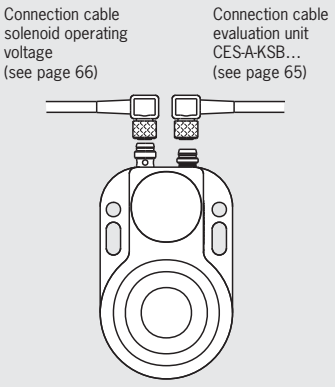
Adjustable adhesive force
This version has an adhesive force also with the guard locking switched off. In this way it is intended, e.g., to prevent the safety door opening due to vibration or similar. The adhesive force can be adjusted using a parameter setting plug to 30 N, 50 N or 80 N.

Your advantages
- Safety switch with transponder coding
  - Every actuator is unique
  - Maximum protection against tampering
- Integrated solenoid for process protection
  - Unintentional opening of the safety door is prevented
- Safety switch and solenoid form a compact unit
- High solenoid locking forces (500 N or 1,000 N)
  - Protection of the machining process
- Simple operating principle
  - No wearing parts
- Robust housing for harsh environments
- Connection via M8 plug connector
  - Low wiring effort
  - Easy to replace if servicing is required
- Approved by DGUV and UL (Canada and USA)

Connection variants read head CEM-A-LE05K-S2/CEM-A-LE05R-S2

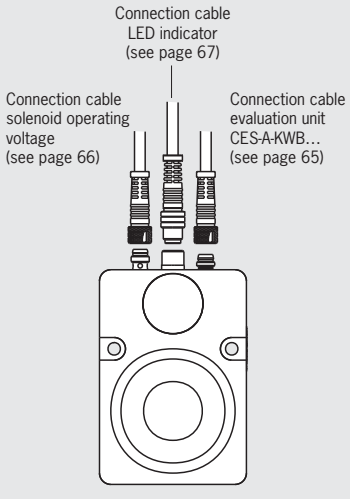


Cable outlet, straight plug connector

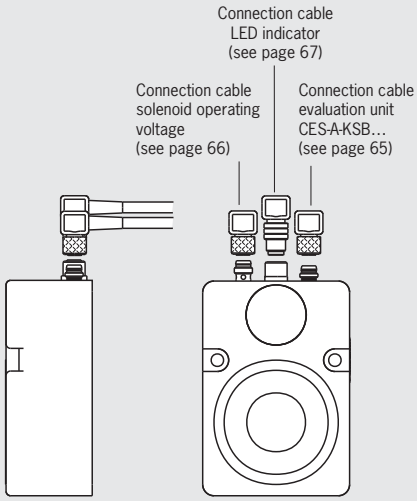


Cable outlet, angled plug connector

Connection variants read head CEM-A-LH10K-S3/CEM-A-LH10R-S3



Cable outlet, straight plug connector



Cable outlet, angled plug connector

Read head CEM-A-LE05...

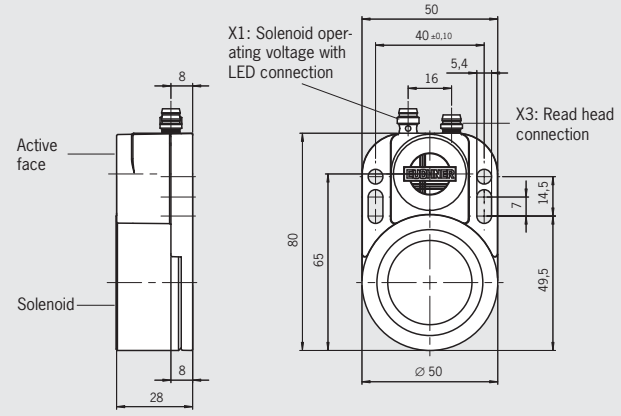
- **Read head with guard locking without guard lock monitoring**
- **Locking force 500 N**
- **With and without remanence**
- **Up to category 4 according to EN ISO 13849-1**

For possible combinations see page 13

Remanence
Read heads without remanence are de-magnetized when the solenoid is switched off.
For this purpose the operating voltage U_B must always be applied.

Read head CEM-A-LE05...

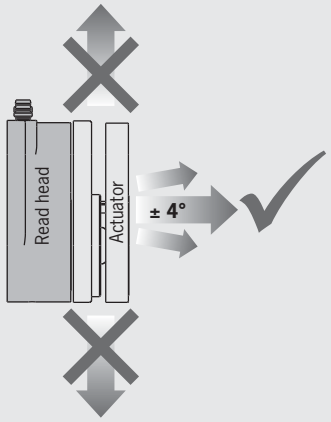
Dimension drawing



2 safety screws M5x16 included

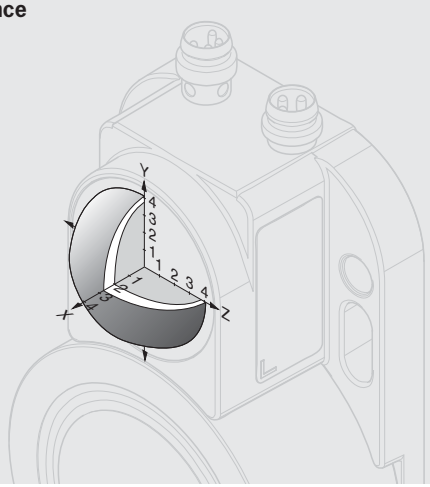
For connection cables see page 65/66

Approach direction



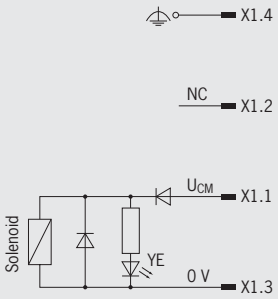
Typical operating distance

Note assured switch-off distance s_{ar} = 20 mm for internal component failure. Safety outputs are reliably switched off.

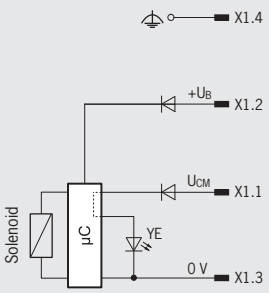


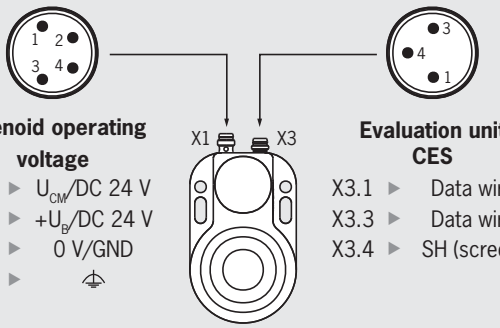
Wiring diagram

CEM-A-LE05K-S2



CEM-A-LE05R-S2





Solenoid operating voltage

X1.1 ▶ U_{CM}/DC 24 V
X1.2 ▶ $+U_B$/DC 24 V
X1.3 ▶ 0 V/GND
X1.4 ▶ ⏚

Evaluation unit CES

X3.1 ▶ Data wire
X3.3 ▶ Data wire
X3.4 ▶ SH (screen)

Circuit diagram connection solenoid operating voltage plug X1
A free-wheeling diode is already integrated into each CEM

Ordering table

Series	Locking force [N]	Version	Order No./item
CEM-A-LE05K-S2	500	With remanence	**094800** CEM-A-LE05K-S2
CEM-A-LE05R-S2	500	Without remanence	**095792** CEM-A-LE05R-S2

Technical data for read head CEM-A-LE05…

Parameter	Value min.	Value typ.	Value max.	Unit
General				
Housing material		Aluminum		
Material, read head CES		Plastic (PPS)		
Solenoid material		Galvanized steel		
Mass		Approx. 0.3		kg
Ambient temperature	-25	-	+50	°C
Degree of protection according to IEC 60529		IP67		
Installation position		Any		
Solenoid				
Locking force in axial direction		500		N
Adhesive force due to remanence - CEM-A-LE05K-S2 [1)] - CEM-A-LE05R-S2		 Approx. 10 ± 25% Approx. 0.5		N
Solenoid center offset max.		± 2.5		mm
Operating voltage U_B plug X1		24 +10%/-15%		V DC
Solenoid voltage U_{CM} plug X1		24 +10%/-15%		
Reverse polarity protection		Yes		
Free-wheeling diode		Yes		
Current consumption CEM-A-LE05K-S2 - at connection X1.1 (U_{CM})		 100		mA
Current consumption CEM-A-LE05R-S2 - at connection X1.2 (U_B) at U_{CM} = 0 V at U_{CM} = 24 V - at connection X1.1 (U_{CM})		 12 100 15		mA
Power consumption - CEM-A-LE05K-S2 - CEM-A-LE05R-S2		 Approx. 2.5 Approx. 2.8		W
Solenoid operating voltage connection		M8 plug connector (male socket), 4-pin Yellow LED integrated in the plug connector (see circuit diagram)		
Read head				
Operating distance for center offset m = 0 - Assured switch-off distance S_{ar} Cable length l = 0 to 25 m - Switch-on distance - Assured switch-on distance S_{ao} - Switching hysteresis	 - - 0 -	 - 2 - 0.7	 20 - - -	mm
Connection evaluation unit plug X3		M8 plug connector (male socket), 3-pin		
Connection cable	-	-	25	m

1) The remanence disappears immediately when the door is opened and over time in de-energized solenoids.

Read head CEM-A-LE05H-S2

- **Read head with guard locking without guard lock monitoring**
- **Locking force 500 N**
- **Adjustable adhesive force**
- **Up to category 4 according to EN ISO 13849-1**

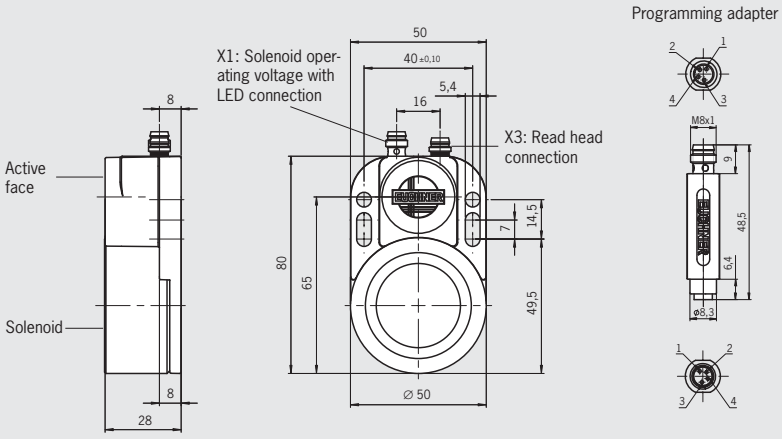
For possible combinations see page 13

Adjustable adhesive force
This version has an adhesive force also with the guard locking switched off. In this way it is intended, e.g., to prevent the safety door opening due to vibration or similar. The adhesive force can be adjusted using a programming adapter to 30 N, 50 N or 80 N.

Important: To change the preset adhesive force, you will need a programming adapter.

Read head CEM-A-LE05H-S2

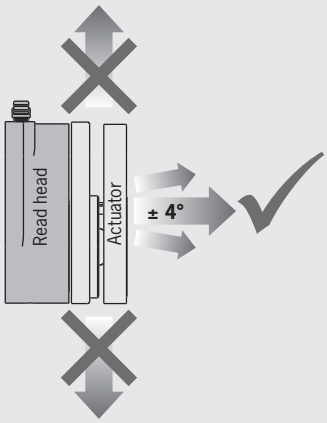
Dimension drawing



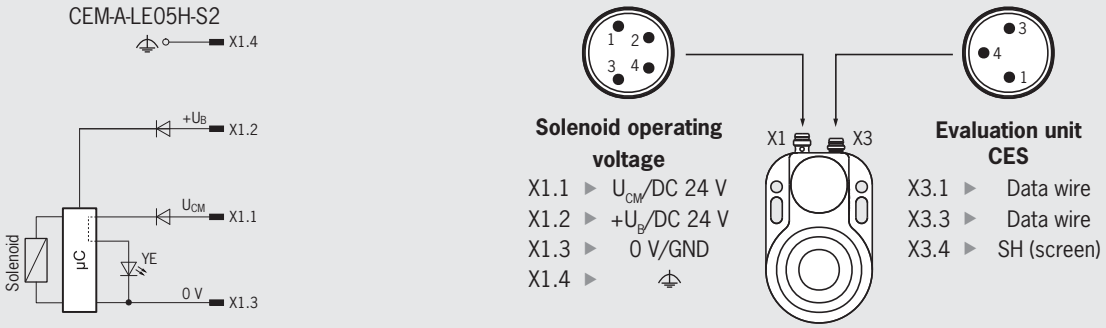
2 safety screws M5x16 included

For connection cables see page 65/66

Approach direction



Wiring diagram



Circuit diagram connection solenoid operating voltage plug X1
A free-wheeling diode is already integrated into each CEM

Ordering table

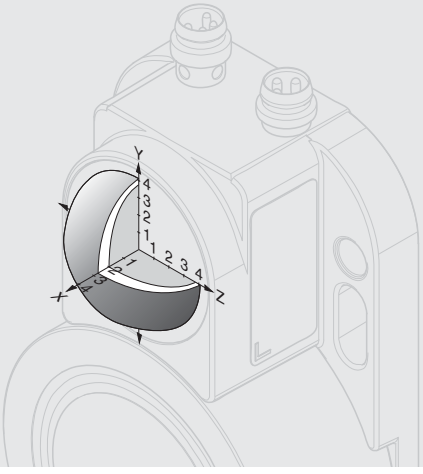
Series	Locking force [N]	Version	Order No./item
CEM-A-LE05H-S2	500	With adjustable adhesive force (50 N preset)	**104606** CEM-A-LE05H-S2
CEM-A-ZPS-110013	-	Programming adapter for setting the adhesive force	**110013** CEM-A-ZPS-110013

Technical data for read head CEM-A-LE05H-S2

Parameter	Value min.	Value typ.	Value max.	Unit
General				
Housing material		Aluminum		
Material, read head CES		Plastic (PPS)		
Solenoid material		Galvanized steel		
Mass		Approx. 0.3		kg
Ambient temperature	-25	-	+50	°C
Degree of protection according to IEC 60529		IP67		
Installation position		Any		
Solenoid				
Adhesive force		30, 50 (factory setting) or 80 Can be adjusted by pre-excitation		N
Locking force in axial direction		500		N
Solenoid center offset max.		± 2.5		mm
Operating voltage U_B plug X1		24 +10%/-15%		V DC
Solenoid voltage U_{CM} plug X1		24 +10%/-15%		
Reverse polarity protection		Yes		
Free-wheeling diode		Yes		
Current consumption				mA
- at connection X1.2 (U_B) at U_{CM} = 0 V at U_{CM} = 24 V		25 100		
- at connection X1.1 (U_{CM})		10		
Power consumption		Approx. 2.8		W
Solenoid operating voltage connection		M8 plug connector (male socket), 4-pin Yellow LED integrated in the plug connector (see circuit diagram)		
Read head				
Operating distance for center offset m = 0				mm
- Assured switch-off distance S_{ar}	-	-	20	
Cable length l = 0 to 25 m				
- Switch-on distance	-	2	-	
- Assured switch-on distance S_{ao}	0	-	-	
- Switching hysteresis	-	0.7	-	
Connection evaluation unit plug X3		M8 plug connector (male socket), 3-pin		
Connection cable	-	-	25	m

Typical operating distance

Note assured switch-off distance s_{ar} = 20 mm for internal component failure. Safety outputs are reliably switched off.



Read head CEM-A-LH10...

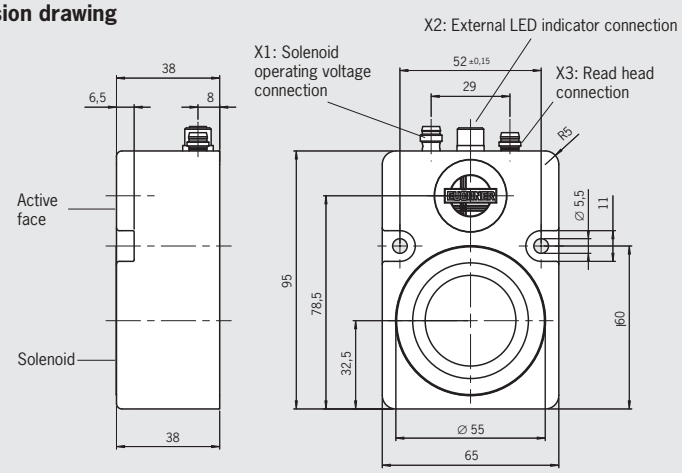
- **Read head with guard locking without guard lock monitoring**
- **Locking force 1,000 N**
- **With and without remanence**
- **Up to category 4 according to EN ISO 13849-1**

For possible combinations see page 13

Remanence
Read heads without remanence are de-magnetized when the solenoid is switched off.
For this purpose the operating voltage U_B must always be applied.

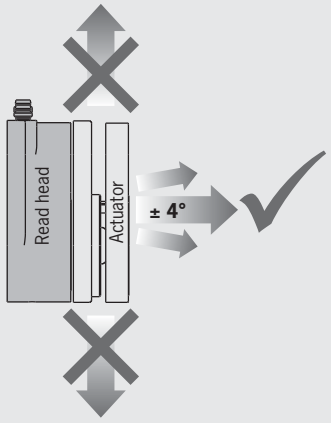
Read head CEM-A-LH10K-S3/CEM-A-LH10R-S3

Dimension drawing



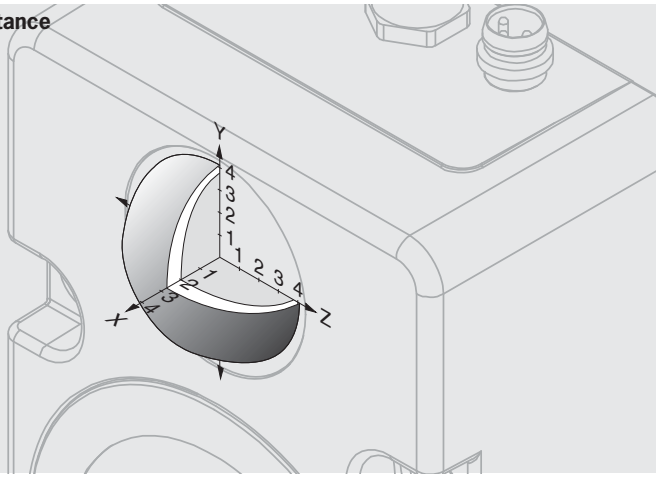
For connection cables see page 65 - 67

Approach direction

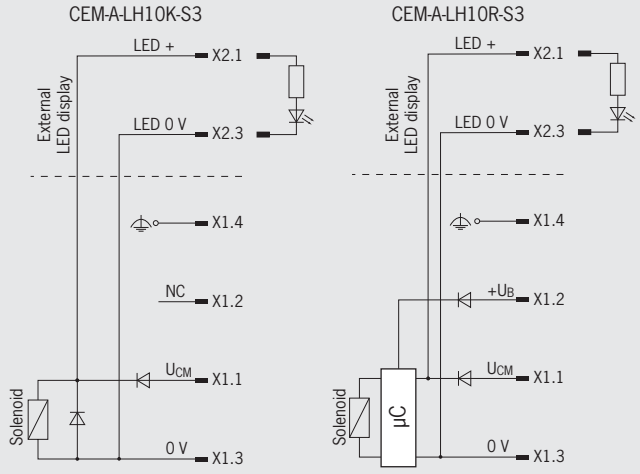


Typical operating distance

Note assured switch-off distance s_{ar} = 20 mm for internal component failure. Safety outputs are reliably switched off.



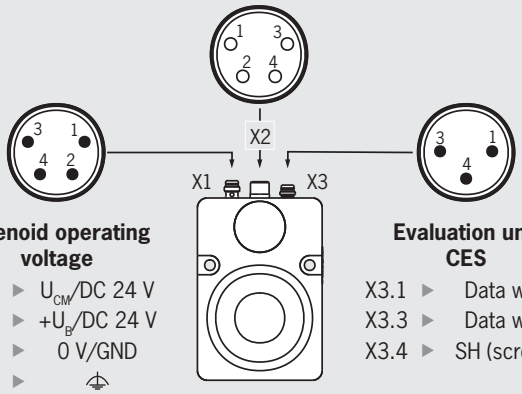
Wiring diagram



Circuit diagram connection solenoid operating voltage plug S1
A free-wheeling diode is already integrated into each CEM

External LED indicator connection

X2.1 ▶	LED +	X2.3 ▶	LED 0 V
X2.2 ▶	-	X2.4 ▶	-



Solenoid operating voltage

X1.1 ▶	U_{CM}/DC 24 V
X1.2 ▶	$+U_B$/DC 24 V
X1.3 ▶	0 V/GND
X1.4 ▶	⏚

Evaluation unit CES

X3.1 ▶	Data wire
X3.3 ▶	Data wire
X3.4 ▶	SH (screen)

Ordering table

Series	Locking force [N]	Version	Order No./item
CEM-A-LH10K-S3	1,000	With remanence	**095170** CEM-A-LH10K-S3
CEM-A-LH10R-S3	1,000	Without remanence	**095793** CEM-A-LH10R-S3

Technical data for read head CEM-A-LH10...

Parameter	Value min.	Value typ.	Value max.	Unit
General				
Housing material		Aluminum		
Material, read head CES		Plastic (PPS)		
Solenoid material		Galvanized steel		
Mass		Approx. 0.9		kg
Ambient temperature	-25	-	+50	°C
Degree of protection according to IEC 60529		IP67		
Installation position		Any		
Solenoid				
Locking force in axial direction		1,000		N
Adhesive force due to remanence				
- CEM-A-LH10K-S3 [1]		Approx. 40 ± 25%		N
- CEM-A-LH10R-S3		Approx. 0.7		
Solenoid center offset max.		± 2.5		mm
Operating voltage U_B plug X1		24 +10%/-15%		V DC
Solenoid voltage U_{CM} plug X1		24 +10%/-15%		
Reverse polarity protection		Yes		
Free-wheeling diode		Yes		
Current consumption CEM-A-LH10K-S3				mA
- at connection X1.1 (U_{CM})		225 (without external LED)		
Current consumption CEM-A-LH10R-S3				mA
- at connection X1.2 (U_B) at U_{CM} = 0 V		12		
at U_{CM} = 24 V		225		
- at connection X1.1 (U_{CM})		15		
Power consumption				W
- CEM-A-LH10K-S3		Approx. 5.4		
- CEM-A-LH10R-S3		Approx. 5.8		
Solenoid operating voltage connection		M8 plug connector (male socket), 4-pin		
External LED indicator connection		M8 plug connector (female socket), 4-pin		
Read head				
Operating distance for center offset m = 0				mm
- Assured switch-off distance S_{ar}	-	-	20	
Cable length l = 0 to 25 m				
- Switch-on distance	-	2	-	
- Assured switch-on distance S_{ao}	0	-	-	
- Switching hysteresis	-	0.7	-	
Connection evaluation unit plug X3		M8 plug connector (male socket), 3-pin		
Connection cable	-	-	25	m
Connection external LED indicator plug X2				
Current consumption	-	-	500	mA

1) The remanence disappears immediately when the door is opened and over time in de-energized solenoids.

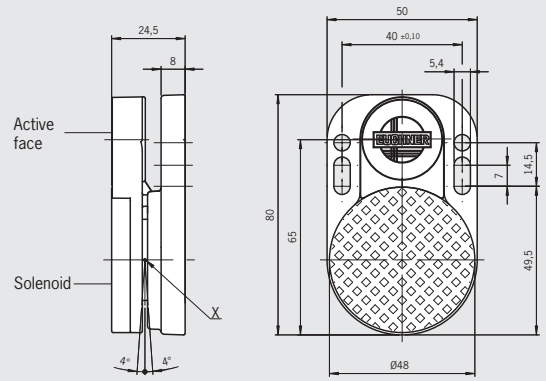
Actuator CEM-A-BE05

- **Locking force 500 N**

For possible combinations see page 13

Actuator CEM-A-BE05

Dimension drawing



2 safety screws
M5x16 included

Ordering table

Series	Order No./item
CEM-A-BE05	**094805** CEM-A-BE05

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Aluminum		
Material, read head CES		Plastic (PPS)		
Solenoid mating plate material		Galvanized steel		
Mass		Approx. 0.18		kg
Ambient temperature	-25	-	+50	°C
Degree of protection according to IEC 60529		IP67		
Installation position		Active face opposite read head		
Adjustment angle (around point X, see dimension drawing)		± 4		°

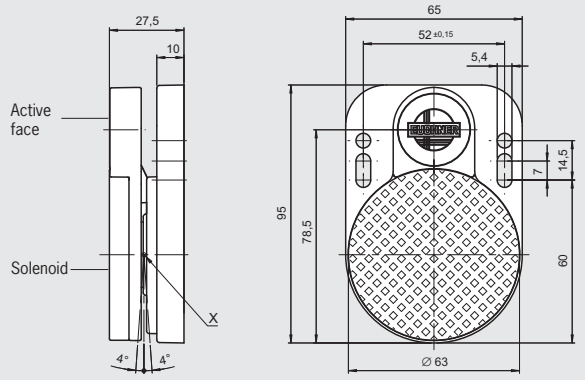
Actuator CEM-A-BH10

- **Locking force 1,000 N**

For possible combinations see page 13

Actuator CEM-A-BH10

Dimension drawing



2 safety screws
M5x16 included

Ordering table

Series	Order No./item
CEM-A-BH10	**095175** CEM-A-BH10

Technical data

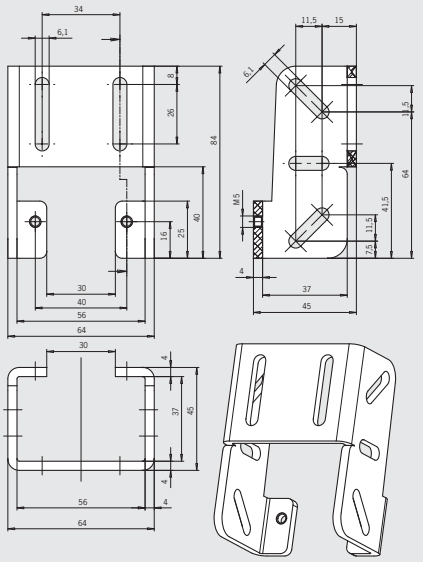
Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	Aluminum			
Material, read head CES	Plastic (PPS)			
Solenoid mating plate material	Galvanized steel			
Mass	Approx. 0.3			kg
Ambient temperature	-25	-	+50	°C
Degree of protection according to IEC 60529	IP67			
Installation position	Active face opposite read head			
Adjustment angle (around point X, see dimension drawing)	± 4			°

Mounting plate CEM

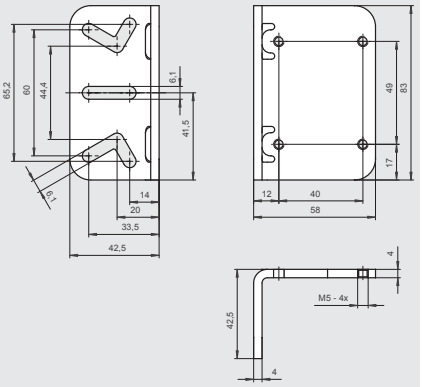
- **For read head CEM-A-LE05... and actuator CEM-A-BE05...**
- **Material stainless steel**

Mounting plate EMP-L-CEM05
for read head CEM-A-LE05...

Dimension drawing



Mounting plate EMP-B-CEM05
for actuator CEM-A-BE05...

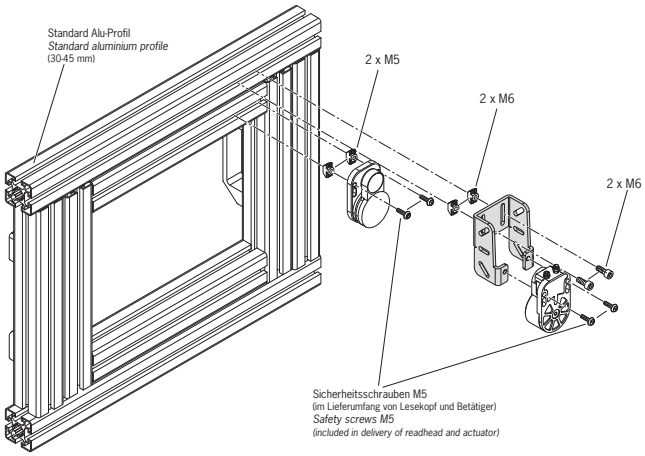


Ordering table

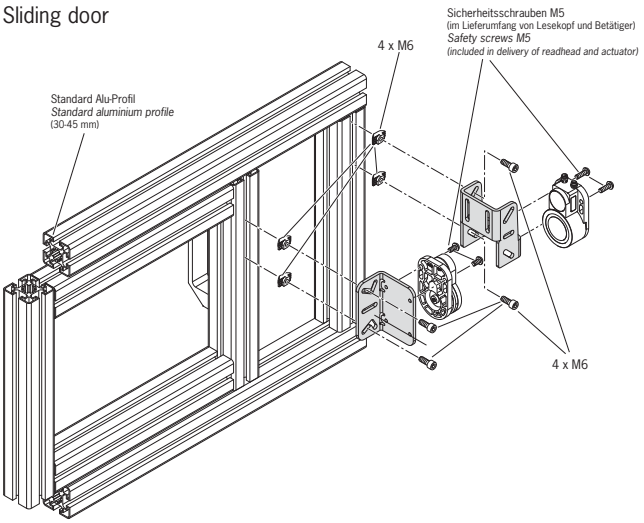
Designation	Use	Order No./item
Mounting plate EMP-L-CEM05	**for read head CEM-A-LE05...**	**099425** EMP-L-CEM05
Mounting plate EMP-B-CEM05	**for actuator CEM-A-BE05...**	**100110** EMP-B-CEM05

Installation examples mounting plates EMP-.-CEM05

Hinged door



Sliding door



Read head CET-AX-...

- **Read head with guard locking and guard lock monitoring**
- **Up to category 4**
- **High locking forces up to 6,500 N**
- **Integrated transponder coding**
- **Metal housing**

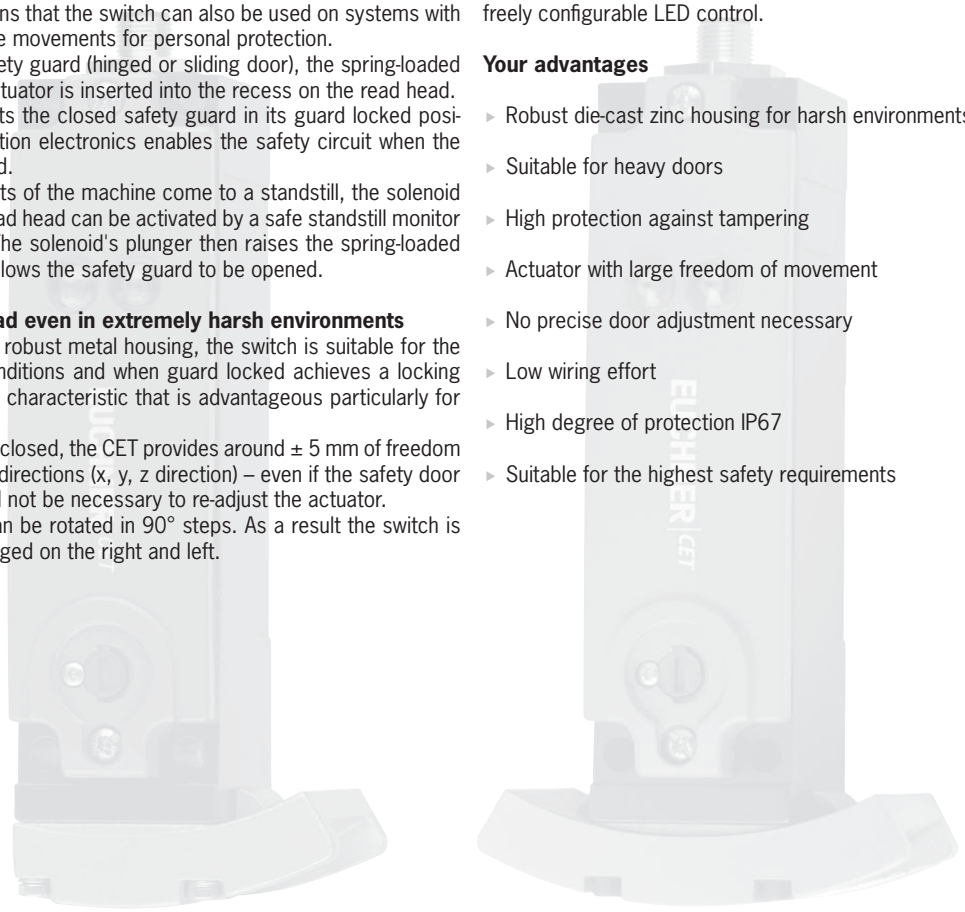
Design and functionality
With the read head CET in combination with an evaluation unit CES-AZ, EUCHNER provides monitored guard locking based on non-contact transponder technology. This means that the switch can also be used on systems with overtraveling machine movements for personal protection.
When closing the safety guard (hinged or sliding door), the spring-loaded transponder in the actuator is inserted into the recess on the read head. The read head detects the closed safety guard in its guard locked position. The CES evaluation electronics enables the safety circuit when the safety guard is locked.
When the moving parts of the machine come to a standstill, the solenoid integrated into the read head can be activated by a safe standstill monitor or by a timer relay. The solenoid's plunger then raises the spring-loaded transponder, which allows the safety guard to be opened.

Use of the read head even in extremely harsh environments
Due to the extremely robust metal housing, the switch is suitable for the harshest ambient conditions and when guard locked achieves a locking force of 6,500 N – a characteristic that is advantageous particularly for heavy doors.
With the safety guard closed, the CET provides around ± 5 mm of freedom of movement in all 3 directions (x, y, z direction) – even if the safety door drops over time it will not be necessary to re-adjust the actuator.
The insertion slide can be rotated in 90° steps. As a result the switch is suitable for doors hinged on the right and left.

Different versions
Along with the standard version with a single ramp, there is also the CET with a double ramp that is perfectly suited to swing doors and rotary tables. That is, wherever the approach is from two sides and where the read head must also be "passed over".
As an option, EUCHNER also offers versions with escape release. This feature enables people locked in to open the locked safety guard from the inside in an emergency.
The range is supplemented by versions with different plug variants and freely configurable LED control.

Your advantages

- Robust die-cast zinc housing for harsh environments
- Suitable for heavy doors
- High protection against tampering
- Actuator with large freedom of movement
- No precise door adjustment necessary
- Low wiring effort
- High degree of protection IP67
- Suitable for the highest safety requirements



Read head CET.-AX-... with guard locking and guard lock monitoring

- **Read head with guard locking**
- **Locking force up to 6,500 N**
- **Up to category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 63
For ordering table see page 61 ff.

Approach direction

Horizontal
Can be adjusted in 90° steps

Mechanical release
Is used for releasing the guard locking with the aid of a tool. The mechanical release must be sealed to prevent tampering (for example with sealing lacquer).

Escape release (optional)
Is used for the manual release of the guard locking from within the danger area without tools.

Wire front release (optional)
The wire front release permits remote release of the guard locking via a pull rope. Flexible routing of the pull wire permits release of the guard locking in inaccessible installation situations.
The handle for the wire front release is not included. Please order separately (see page 62).

Lockout mechanism
The lockout mechanism can be used to prevent maintenance personnel from being unintentionally locked in the danger area, for example. In locked position, the lockout mechanism prevents activation of guard locking. The lockout mechanism can be secured in locking position with up to three locks. The mechanical release can still be used.

Solenoid operating voltage

▸ DC	24 V	+10%, -15%

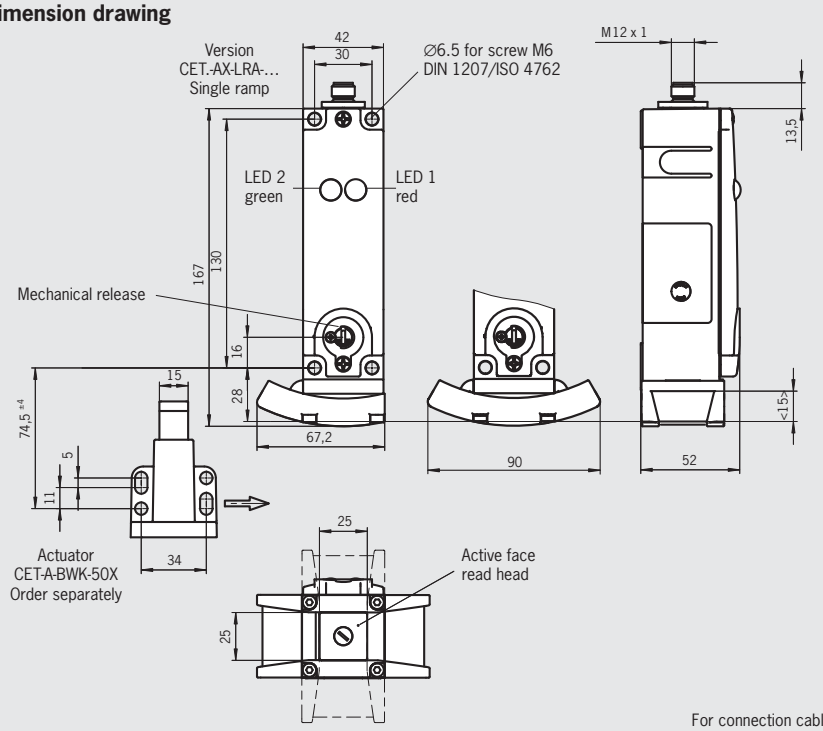
Guard locking types
- **CET1** Closed-circuit current principle
  Release by applying voltage to the guard locking solenoid.
- **CET2** Open-circuit current principle
  Guard locking by applying voltage to the guard locking solenoid.
  Release by spring force.

LED function display
- **LED red** illuminates when solenoid is switched on or freely configurable
- **LED green** freely configurable

Category according to EN ISO 13849-1
The category in accordance with EN ISO 13849-1 is dependent on the evaluation unit and on the installation position (see table of possible combinations on page 63).

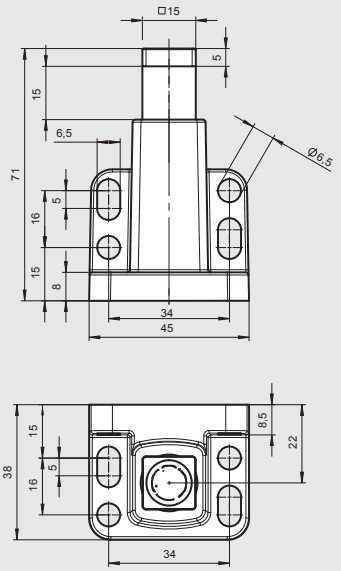
Read head CET.-AX-...
with plug connector M12

Dimension drawing



For connection cables see page 68

Actuator CET-A-BWK-50X
for read head CET-AX



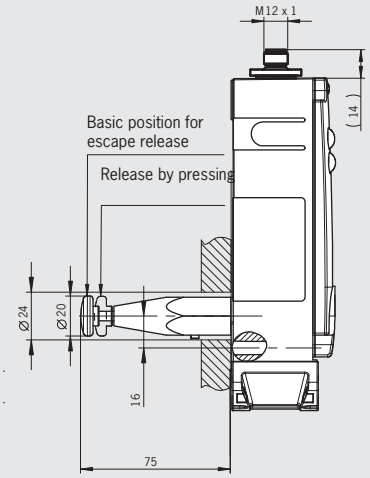
4 safety screws
M5x16 included

Notes
- Special EUCHNER connection cables are required for the connection (see page 69/70/72). Please take into account in the order!
- The read head CET is only allowed to be operated in conjunction with the actuator CET-A-BWK-50X. The actuator must be ordered separately.

Read head CET...
with escape release

Dimension drawing

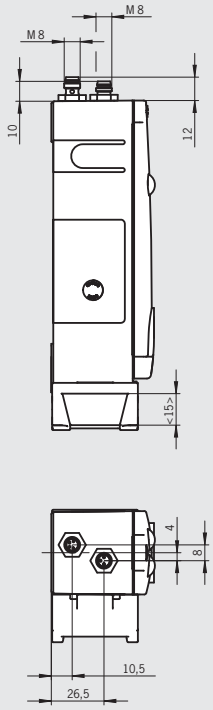
Order no.
102161
103750
111918



For connection cables see page 68

Read head CET...
with 2 plug connectors M8

Order no.
102988
103444
109932

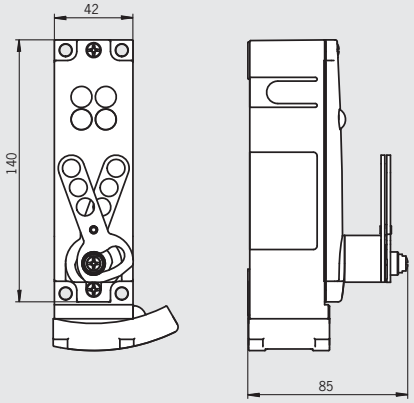


For connection cables see page 65/66

Read head CET...
with lockout mechanism

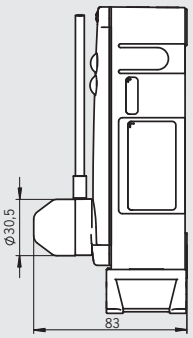
Dimension drawing

Order no.
111917
111918



Read head CET...
with wire front release

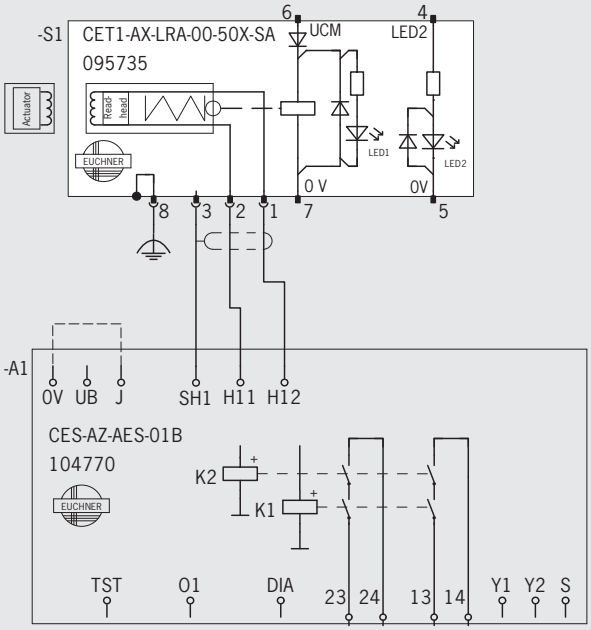
Order no.
On request



Wiring diagrams

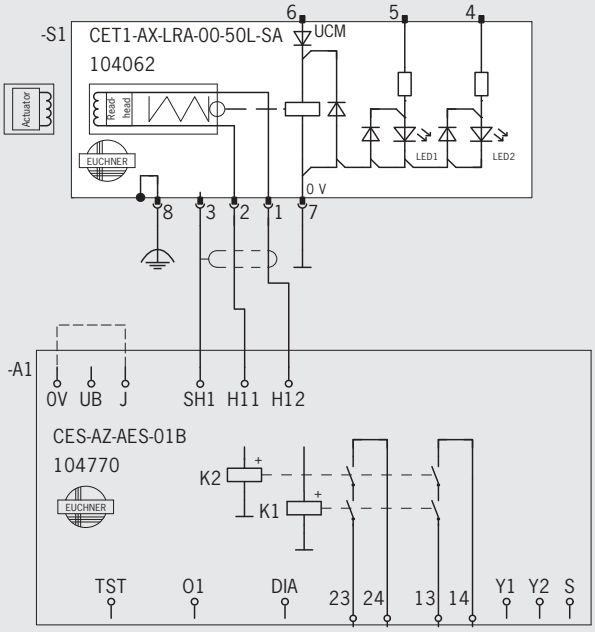
Order no.
095735
100399
102161
103750
104051
106039
111917
111918

With plug connector M12



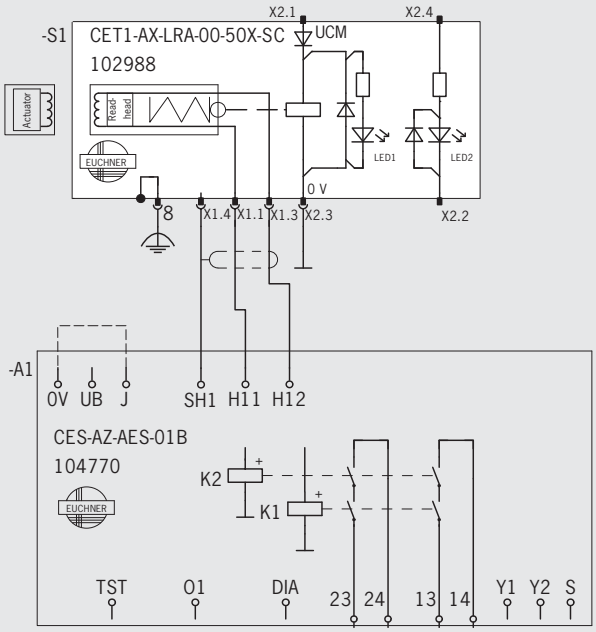
Order no.
104062

With plug connector M12 and 2 freely configurable LEDs



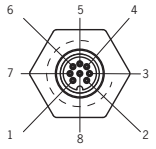
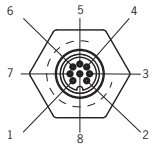
Order no.
102988
103444
109932

With 2 plug connectors M8



Read head CET.-AX-... with plug connector M12

Terminal assignment

Read head	Plug connector (view of connection side)	Pin	Function	Wire color connection cable*
CET1-AX-LRA-00-50X-SA **095735** CET1-AX-LDA-00-50X-SE **100399** CET1-AX-LRA-00-50F-SA **102161** CET1-AX-LDA-00-50F-SA **103750** CET1-AX-LRA-00-50X-SF **104051** CET1-AX-LRA-00-50X-SA-C2333-1119177 **111917** CET1-AX-LRA-00-50F-SA-C2333-111918 **111918** CET2-AX-LRA-00-50X-SA **106039** 2)	With plug connector M12  For connection cable see page 72	1	H1, read head data wire	WH
		2	H2, read head data wire	BN
		3	SH, data wire screen	(Screen)
		4	LED 2 freely configurable, 24 V	YE
		5	0V	GY
		6	UCM, U_B/24 V solenoid	PK
		7	0 V/GND solenoid	BU
		8	Housing	RD
CET1-AX-LRA-00-50L-SA **104062**	With plug connector M12 and 2 freely configurable LEDs  For connection cable see page 72	1	H1, read head data wire	WH
		2	H2, read head data wire	BN
		3	SH, data wire screen	(Screen)
		4	LED 2 freely configurable, 24 V	YE
		5	LED 1 freely configurable, 24 V	GY
		6	UCM, U_B/24 V solenoid	PK
		7	0 V/GND solenoid and LEDs	BU
		8	Housing	RD

* Only for standard EUCHNER connection cable

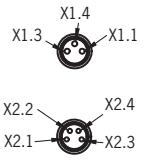
Ordering table

Order no./item	Closed-circuit current principle	Open-circuit current principle	Single ramp	Double ramp	Escape release	Wire front release	Lockout mechanism	2 LEDs (1 freely configurable)	2 LEDs (2 freely configurable)
095735 CET1-AX-LRA-00-50X-SA	●		●					●	
100399 CET1-AX-LDA-00-50X-SE	●			●				●	
102161 CET1-AX-LRA-00-50F-SA	●		●		75 mm			●	
103750 CET1-AX-LDA-00-50F-SA	●			●	75 mm			●	
104051 1) CET1-AX-LRA-00-50X-SF	●		●					●	
111917 CET1-AX-LRA-00-50X-SA-C2333-111917	●		●				●	●	
111918 CET1-AX-LRA-00-50F-SA-C2333-111918	●		●		75 mm		●	●	
106039 2) CET2-AX-LRA-00-50X-SA		●	●					●	
104062 CET1-AX-LRA-00-50L-SA	●		●						●

1) Plug connector can be rotated by 360°
2) No German Social Accident Insurance or UL approval

Read head CET.-AX-... with 2 plug connectors M8

Terminal assignment

Read head	Plug connector (view of connection side)	Pin	Function	Wire color connection cable*
CET1-AX-LRA-00-50X-SC **102988** CET1-AX-LDA-00-50X-SC **103444** CET2-AX-LRA-00-50X-SC **109932** 2)	With 2 plug connectors M8  For connection cable see page 66/67	X 1.1	H1, read head data wire	BN
		X 1.3	H2, read head data wire	WH
		X 1.4	SH, data wire screen	BU
		X 2.1	UCM, U_B/24 V solenoid	BN
		X 2.2	0V	WH
		X 2.3	0 V/GND solenoid	BU
		X 2.4	LED 2 freely configurable, 24 V	BK

* Only for standard EUCHNER connection cable

Ordering table

Order no./item	Closed-circuit current principle	Open-circuit current principle	Single ramp	Double ramp	Escape release	Wire front release	Lockout mechanism	2 LEDs (1 freely configurable)	2 LEDs (2 freely configurable)
102988 CET1-AX-LRA-00-50X-SC	●		●			On request		●	
103444 CET1-AX-LDA-00-50X-SC	●			●				●	
109932 1) CET2-AX-LRA-00-50X-SC		●	●					●	

1) No German Social Accident Insurance or UL approval

Accessories

Ordering table

Designation	Version/usage	Order no./item
Actuator for CET...	Incl. safety screws	**096327** CET-A-BWK-50X
Safety screws M5 x 16	Spare screws for actuator CET-A-BWK-50X Packaging unit: 100 ea.	**073456** M5x16/V100
Handle for wire front release	For read head CET-AX with wire front release	**099795** Handle for wire front release

Technical data for read head CET...

Safety switches

Parameter	Value			Unit
	min.	typ.	max.	
General				
Material, ramp		Stainless steel		
Material, read head housing		Die-cast aluminum		
Installation position		Any (recommendation: actuating head downward)		
Degree of protection according to IEC 60529		IP67 (screwed tight with the related mating connector)		
Mechanical life		1 x 10^6 operating cycles		
Ambient temperature	-20	-	+55	°C
Actuator approach speed, max.		20		m/min
Locking force, max.		6,500		N
Locking force F_{Zh} in acc. with GS-ET-19		$F_{Zh} = \frac{F_{max}}{1.3} = 5{,}000$		
Mass		Approx. 1.0		kg
Freedom of movement X, Y, Z (in guard locked position)		X and Y: ± 5; Z: ± 4		mm
Switching frequency		1 Hz (This value can vary depending on the evaluation unit used. See system documentation of the related evaluation unit)		
Connection		M12 plug connector, 8-pin / 2 M8 plug connectors, 3- and 4-pin		
Cable length	-	-	25	m
Rated insulation voltage U_i		50		V
Rated impulse withstand voltage U_{imp}		0.8		kV
Solenoid				
Connection		Reverse polarity protected		
Solenoid operating voltage		24 +10%, -15%		V DC
Solenoid power consumption		12		W
Duty cycle		100		%

Actuator

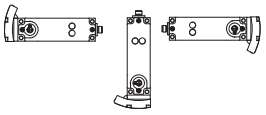
Parameter	Value			Unit
	min.	typ.	max.	
General				
Housing material		Stainless steel		
Installation position		Active face opposite read head		
Degree of protection according to IEC 60529		IP67		
Mechanical life		1 x 10^6 operating cycles		
Ambient temperature	-20	-	+55	°C
Locking force, max.		6,500		N
Mass		Approx. 0.25		kg
Stroke max.		15		mm
Power supply		Inductive, via read head		

LED

Parameter	Value			Unit
	min.	typ.	max.	
General				
Connection voltage		24 ± 15%		V
Current consumption, max.		6		mA

Important:
The maximum safety category that can be achieved in accordance with EN ISO 13849-1 is dependent on the installation position of the safety switch and the evaluation unit used. Pay attention to the table below during the selection of the evaluation unit.

Combination options
(extract only; you will find further possible combinations in the system manual for the evaluation unit used)

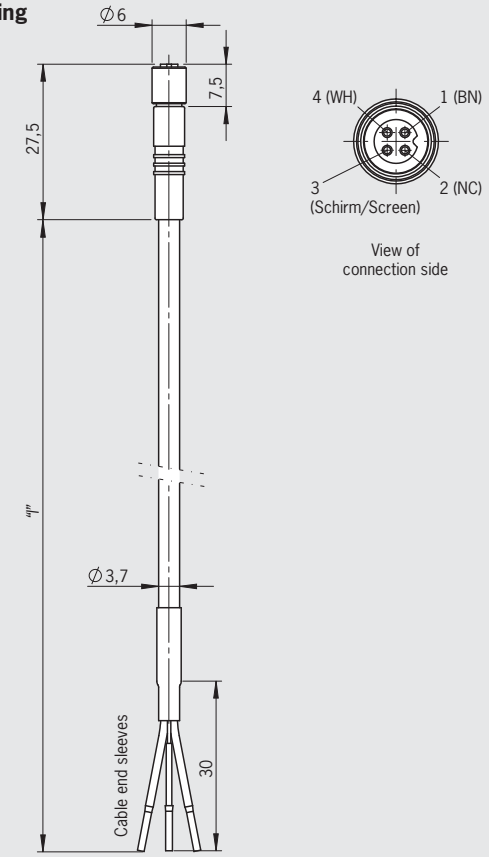
Read head/ order number	Evaluation unit/ order number	Installation position	Achievable category and PL according to EN ISO 13849-1
CET.-AX-...	CES-AZ-.ES-...	Head upward 	3 / PL e In this installation position the PFH_d value of the system (evaluation unit + read head) decreases to 4.29 x 10^{-8}
		Head downward or horizontal 	4 / PL e In this installation position the PFH_d value for the system (evaluation unit + read head) is the same as that for the evaluation unit

Connection cables with plug connectors

▶ **For read heads with M5 plug connector**

for CES-A-LSP-..SB
straight, M5 socket, 3-pin

Dimension drawing



Ordering table

Use	Plug connector	Type of cable	Cable length [m]	Order No./item
For read heads CES-A-LSP-..SB	**Straight**	**V** PVC cable	5	**105555** C-M05F03-02X014PV05,0-ES-105555
			10	**105556** C-M05F03-02X014PV10,0-ES-105556
			20	**105559** C-M05F03-02X014PV20,0-ES-105559

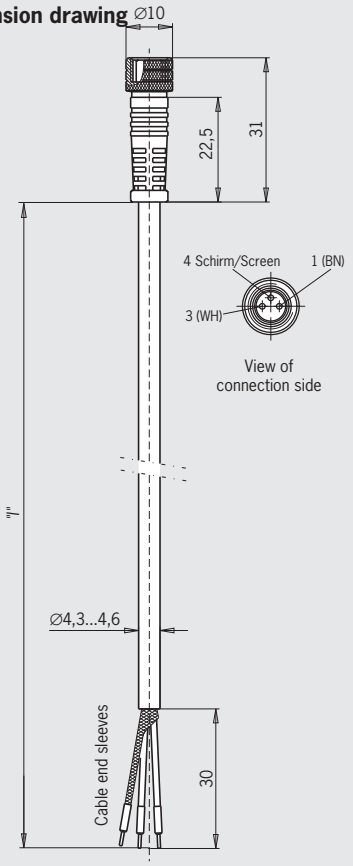
Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector	3-pin M5 female connector, straight			
Connection	Screw terminal, knurled nut not connected to cable screen			
Conductor cross-section	2 x 0.14 screened			mm²
Material, outer sheath	PVC ∅ 3.7 mm			mm
Cable length	Max. 25 (taking into account the switching distance)			m

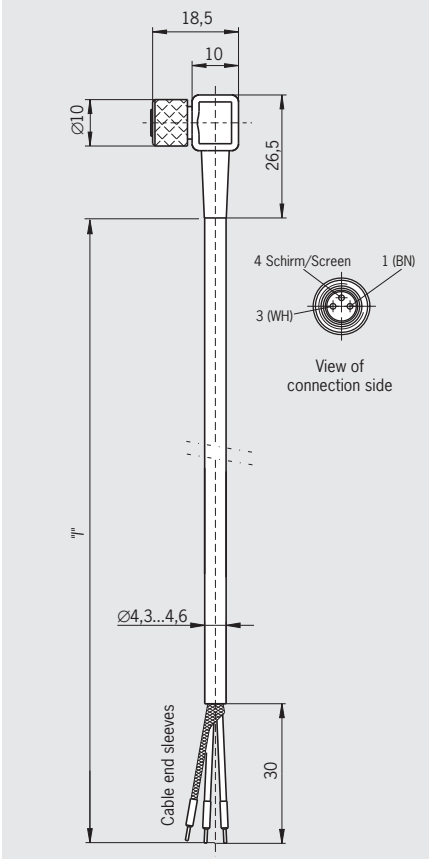
▶ **For read heads with M8 plug connector**

for CES-A-L.../CEM-A-L.../CET-AX/CKS
straight, M8 socket, 3-pin

Dimension drawing



for CES-A-L.../CEM-A-L.../CET-AX/CKS
angled, M8 socket, 3-pin



Ordering table

Use	Plug connector	Type of cable	Cable length [m]	Order No./item
For Read heads CES-A-L.../ CEM-A-L.../ CET-AX-L...-SC/ CKS...-SC	**Straight**	**V** PVC cable	3	**077935** C-M08F03-02X025PV03,0-ES-077935
			5	**077793** C-M08F03-02X025PV05,0-ES-077793
			10	**077767** C-M08F03-02X025PV10,0-ES-077767
			20	**077716** C-M08F03-02X025PV20,0-ES-077716
			25	**077717** C-M08F03-02X025PV25,0-ES-077717
	Straight	**P** PUR cable	5	**084762** C-M08F03-02X025PU05,0-ES-084762
			10	**084763** C-M08F03-02X025PU10,0-ES-084763
			15	**084764** C-M08F03-02X025PU15,0-ES-084764
			20	**084765** C-M08F03-02X025PU20,0-ES-084765
			25	**084766** C-M08F03-02X025PU25,0-ES-084766
	Angled	**V** PVC cable	10	**084701** C-M08F03-02X025PV10,0-ES-084701
			25	**099998** C-M08F03-02X025PV25,0-ES-099998
		P PUR cable	10	**098590** C-M08F03-02X025PU10,0-ES-098590

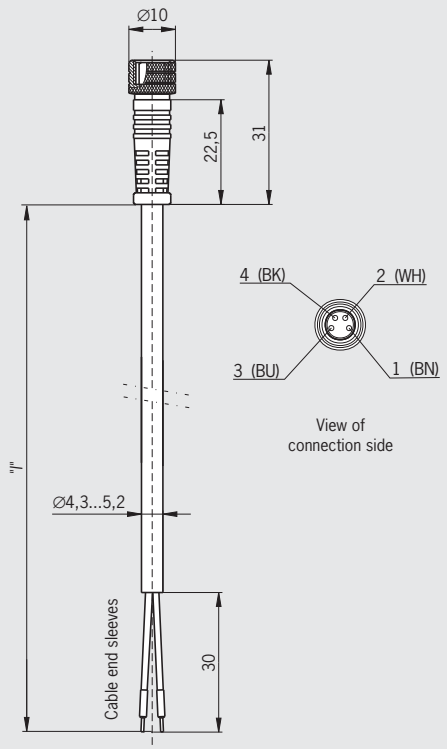
Technical data

Parameter	Value min.	typ.	max.	Unit
Plug connector	3-pin M8 female connector, straight			
Connection	Screw terminal, knurled nut not connected to cable screen			
Conductor cross-section	2 x 0.25 screened			mm²
Material, outer sheath	PVC ∅ 4.6 or PUR ∅ 4.3 (PUR cables are suitable for drag chains)			mm
Cable length	Max. 25 (taking into account the switching distance)			m

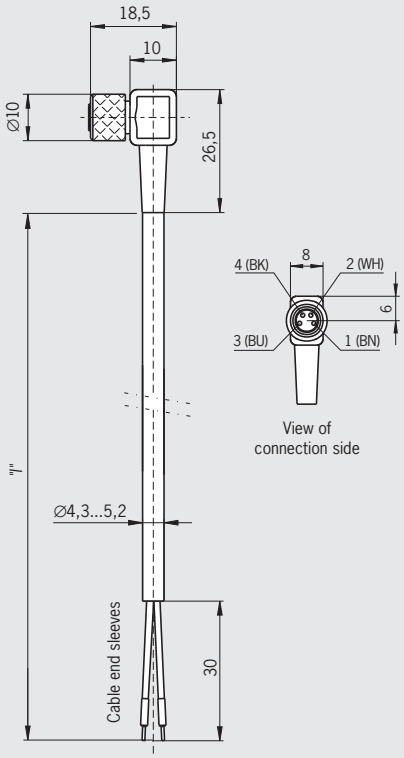
Connection cables with plug connectors

For solenoid operating voltage read head CEM/CET-AX straight, M8 socket, 4-pin

Dimension drawing



For solenoid operating voltage read head CEM/CET-AX angled, M8 socket, 4-pin



Ordering table

Use	Plug connector	Type of cable	Cable length [m]	Order No./item
For solenoid operating voltage read heads CEM-A-L.../ CET-AX-L...-SC	**Straight**	**V** PVC cable	5	**088813** C-M08F04-04X025PV05,0-ES-088813
			10	**088814** C-M08F04-04X025PV10,0-ES-088814
			15	**088815** C-M08F04-04X025PV15,0-ES-088815
			25	**095035** C-M08F04-04X025PV25,0-ES-095035
		U PUR cable	5	**116049** C-M08F04-04X034PU05,0-ES-116049
			10	**116050** C-M08F04-04X034PU10,0-ES-116050
			20	**116051** C-M08F04-04X034PU20,0-ES-116051
	Angled	**V** PVC cable	10	**084703** C-M08F04-04X025PV10,0-ES-084703

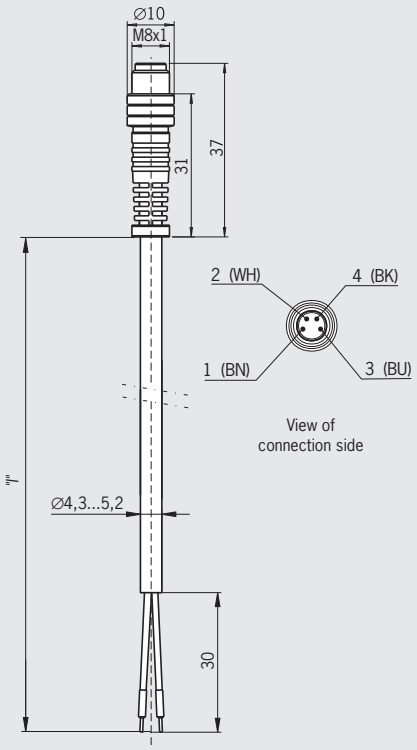
Technical data

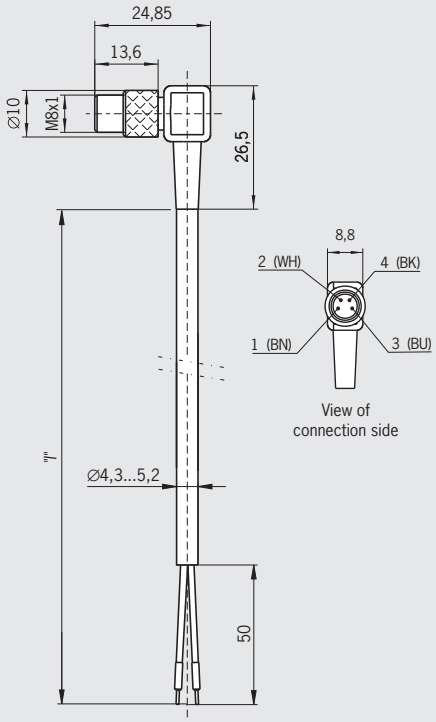
Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector	4-pin M8 female connector			
Connection	Screw terminal			
Conductor cross-section	PVC: 4 x 0.25 / PUR: 4 x 0.34			mm²
Material, connector housing	PVC: PUR black / PUR: TPU black			
Material, outer sheath	PVC ∅ 5.0 / PUR ∅ 4.7			mm
Material, union nut	CuZn nickel-plated			
Static bending radius	5 x cable ∅	-	-	

For LED indicator read head CEM-A-LH10...
straight, M8 plug, 4-pin

For LED indicator read head CEM-A-LH10...
angled, M8 plug, 4-pin

Dimension drawing





Ordering table

Use	Plug connector	Type of cable	Cable length [m]	Order No./item
For LED indicator read head CEM-A-LH10...	**Straight**	**V** PVC cable	2	**088841** C-M08M04-04X025PV02,0-ES-088841
			5	**088842** C-M08M04-04X025PV05,0-ES-088842
			10	**088843** C-M08M04-04X025PV10,0-ES-088843
			15	**088844** C-M08M04-04X025PV15,0-ES-088844
	Angled	**V** PVC cable	10	**084705** C-M08M04-04X025PV10,0-ES-084705

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		4-pin M8 plug		
Connection		Screw terminal		
Conductor cross-section		4 x 0.25		mm²
Material, connector housing		PUR black		
Material, outer sheath		PVC ∅ 5.0		mm
Material, union nut		CuZn nickel-plated		
Bending radius		Min. 10 x sheath diameter		mm

Connection cables with plug connectors

▶ **For read heads with M12 plug connector**

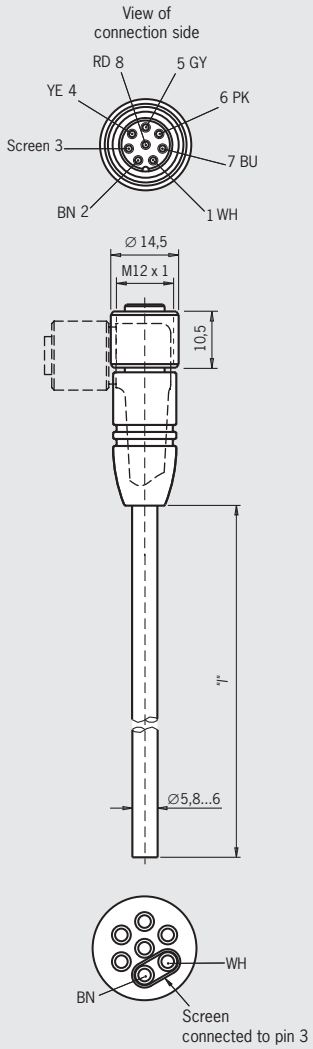
These special connection cables are needed for the connection of the CET to a CES evaluation unit. Please take into account in the order! Interference is prevented by special screening.

Important
Connection cables are not allowed to be extended.

Note
The connection cables with PUR sheath are suitable for drag chains with a minimum bending radius of 60 mm (10 times the cable diameter).

for CET...
straight/angled, M12 socket, 8-pin

Dimension drawing



Ordering table

Use	Sheath	Plug connector	Cable length [m]	Order no.
for CET... Connection cable 7 x 0.25 mm² with plug connector M12 and flying lead	**PVC**	**Straight**	10	**099633** C-M12F08-07X025PV10,0-MA-099633
			20	**099634** C-M12F08-07X025PV20,0-MA-099634
			25	**103115** C-M12F08-07X025PV25,0-MA-103115
		Angled	10	**100456** C-M12F08-07X025PV10,0-MA-100456
			20	**105071** C-M12F08-07X025PV20,0-MA-105071
	PUR	**Straight**	10	**102218** C-M12F08-07X025PU10,0-MA-102218
			25	**103782** C-M12F08-07X025PU25,0-MA-103782

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		8-pin M12 female connector		
Connection		Screw terminal		
Conductor cross-section		7 x 0.25		mm²
Material, connector housing		TPU, self-extinguishing		
Material, union nut		CuZn nickel-plated		
Material, outer sheath		See ordering table		
Bending radius		min. 10 x cable diameter		

Plug connector and connection set

- **Plug connector for extending the connection cable**
- **For read heads CES-A-L.../CEM-A-L...**

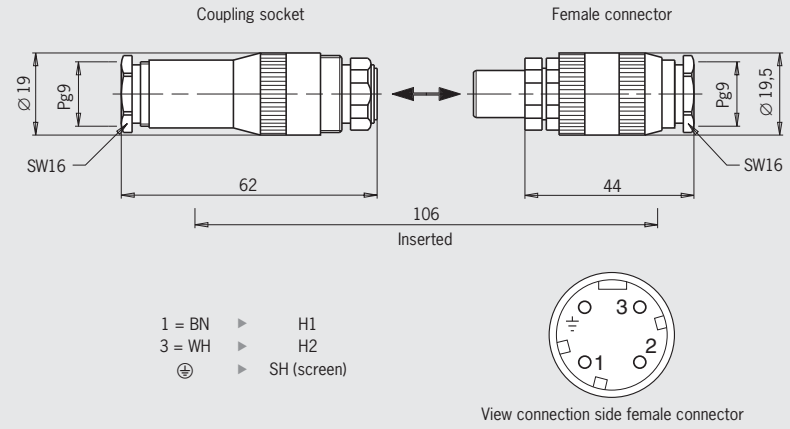
Using EUCHNER couplings/plug connectors, the user can cut the read head cable to size on site at any point and connect the couplings/plug connectors.

Note
The connection cable for the read head can only be extended using these self-assembly couplings/plug connectors under the following conditions:
- The total maximum cable length is 25 m, taking into account the switch-on distance.
- The cable specified by EUCHNER must be used for the extension (screened, strand cross-section 2 x 0.25 mm²).
- The plug connector housing must be electrically isolated from the machine ground.

Coupling socket
3-pin + PE

Female connector
3-pin + PE

Dimension drawing



Ordering table

Designation	Version	Order No./item
KD4C1851 3-pin + PE	Coupling socket for female connector BS4C1851	**077434** KD4C1851
BS4C1851 3-pin + PE	Female connector for coupling socket KD4C1851	**077435** BS4C1851

Technical data

Parameter	Value			Unit
	min.	typ.	max.	
Housing material		CuZn, matt chromium-plated		
Degree of protection acc. to EN 60529		IP65 (inserted)		

- **Plug-in connection terminals for evaluation unit CES-AZ**

Ordering table

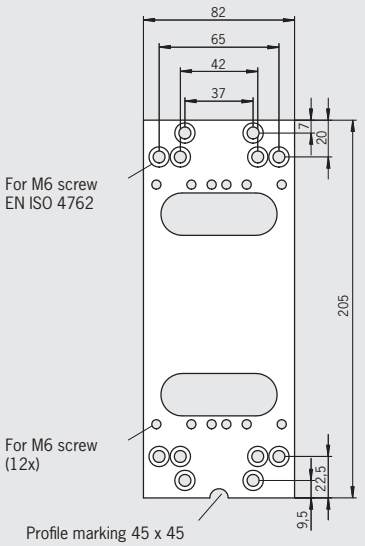
Designation	Version	Order No./item
Connection set for evaluation unit CES-AZ-...-01B	Plug-in screw terminals	**104756** CES-EA-TC-AK04-104756
	Plug-in spring terminals	**112631** CES-EA-TC-KK04-112631
Connection set for evaluation unit CES-AZ-...-02B	Plug-in screw terminals	**104771** CES-EA-TC-AK06-104771
	Plug-in spring terminals	**112630** CES-EA-TC-KK06-112630
Connection set for evaluation unit CES-AZ-...S-04B	Plug-in screw terminals	**104776** CES-EA-TC-AK08-104776
	Plug-in spring terminals	**112629** CES-EA-TC-KK08-112629

Mounting plate CET

- **Mounting plate for read head CET for hinged or sliding doors**
- **Suitable for aluminum profiles 40 ... 45 mm**
- **Horizontal and vertical mounting**
- **Made of aluminum**
- **Suitable for CET with escape release**

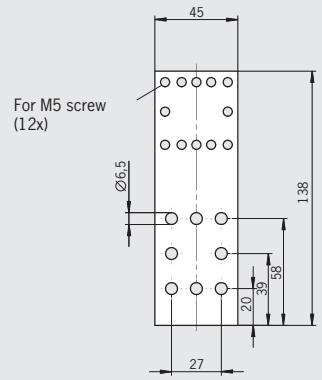
Mounting plate EMP-L-CET
for read head CET

Dimension drawing



Material thickness 10 mm

Mounting plate EMP-B-CET
for actuator CET

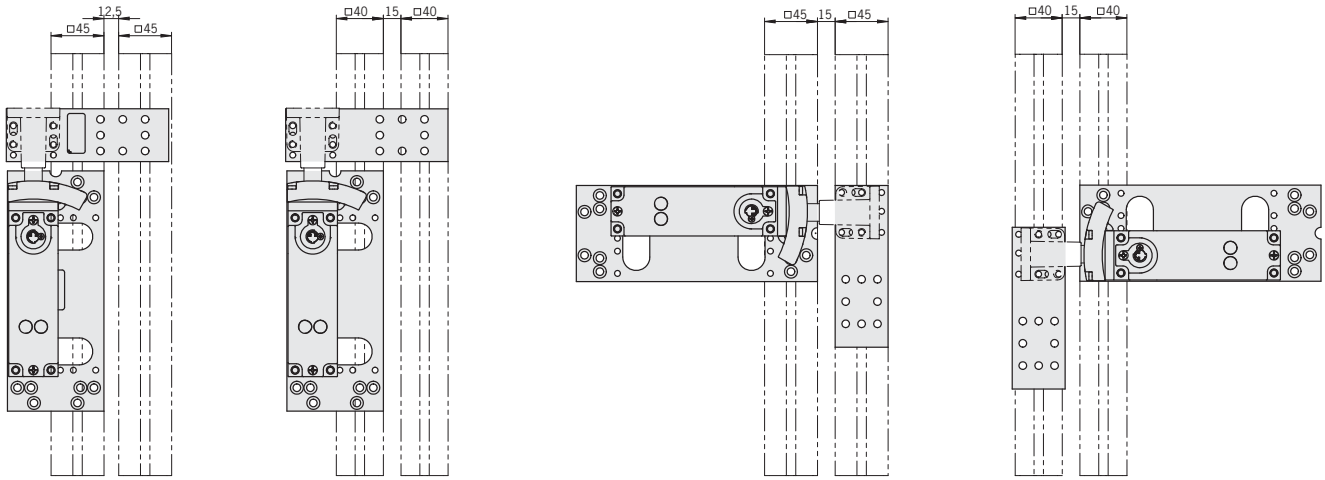


Material thickness 10 mm

Ordering table

Designation	Use	Order No./item
Mounting plate EMP-L-CET	**for read head CET**	**106695** EMP-L-CET
Mounting plate EMP-B-CET	**for actuator CET**	**106694** EMP-B-CET

Installation example mounting plates EMP-.-CET



Safety screws

Ordering table

Fixing material/ screw size	Version/usage	Packaging unit [qty.]	Order no.
Installation material for **Bosch profiles with 8-mm slot**	Read heads CES-A-LSP and actuators CES-A-BSP	2+2	**106633**
Installation material for **Bosch profiles with 10 mm slot**	Read heads CES-A-LSP and actuators CES-A-BSP	2+2	**106634**
Installation material for **ITEM profiles with 8-mm slot**	Read heads CES-A-LSP and actuators CES-A-BSP	2+2	**106635**
Safety screws **M4 x 14** (small head)	Read heads CES-A-LN..., CES-A-LC..., CES-A-LQ... and actuators CES-A-BB..., CES-A-BCA, CES-A-BQ...	20	**071863**
Safety screws **M5 x 16**	Read heads CEM-A-LE... and actuators CET-A-BWK, CEM-A-B...	100	**073456**

Miscellaneous accessories

- **Mechanical key release for read head CET**
- **Emergency unlocking for read head CET**

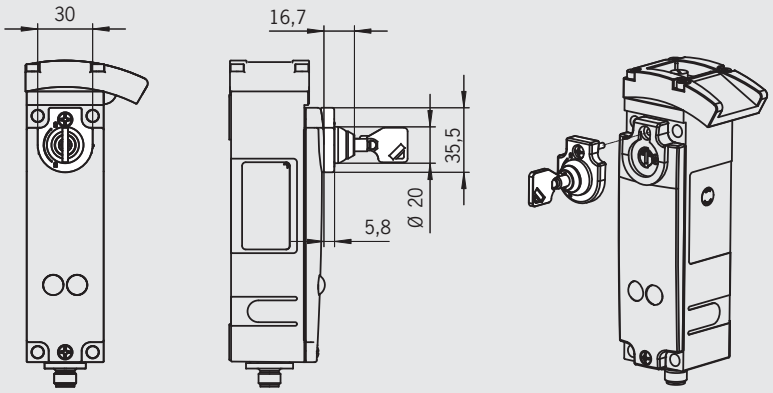
Mechanical key release

The mechanical key release is used in conjunction with the read head CET. It enables authorized personnel to actuate the mechanical release using the related key. The unlocking mechanism holds the solenoid in the "unlocked" position.
A screw is used to fix the lock to the cover of the read head CET (over the mechanical release).
The lock is identical locking.

- Order read head CET separately
- 2 keys included (for spare keys see ordering table below)
- Read heads CET can be upgraded with the mechanical key release

Mechanical key release
for read head CET

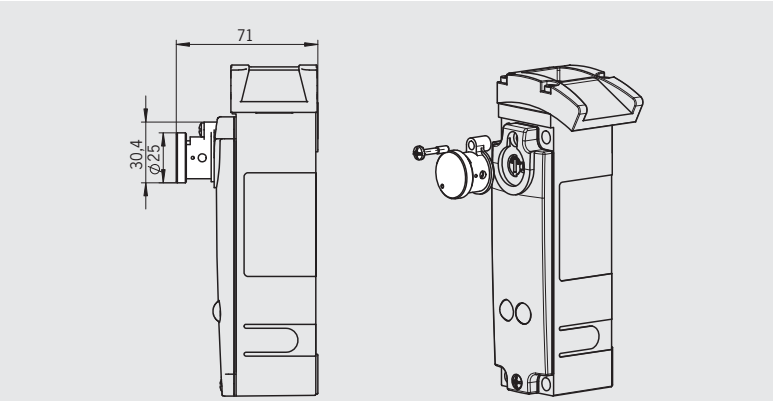
Dimension drawing



Emergency unlocking

Using the emergency unlocking the read head can be unlocked manually. In the locked position of the emergency unlocking, a ball detent mechanism prevents unintentional unlocking of the read head due to vibration or similar.
In the unlocked position of the emergency unlocking, an integrated bolt engages in a bore on the flange. To reset the emergency unlocking, first the bolt must be pressed inwards, out of the detent mechanism, using a tool.
The emergency unlocking can be lead-sealed (lead seal kit order no. 087256).

Emergency unlocking
for read head CET



Ordering table

Designation	Use	Version	Order No./item
Mechanical key release	for read head CET	identical locking, incl. 2 keys	**098850** Mechanical key release
Replacement key	for mechanical key release, identical locking	2 keys, identical locking	**099434** Replacement key
Emergency unlocking	for read head CET	latching in both positions	**103714** Emergency unlocking CET
Lead seal kit	for emergency unlocking		**087256** Lead seal kit for emergency unlocking

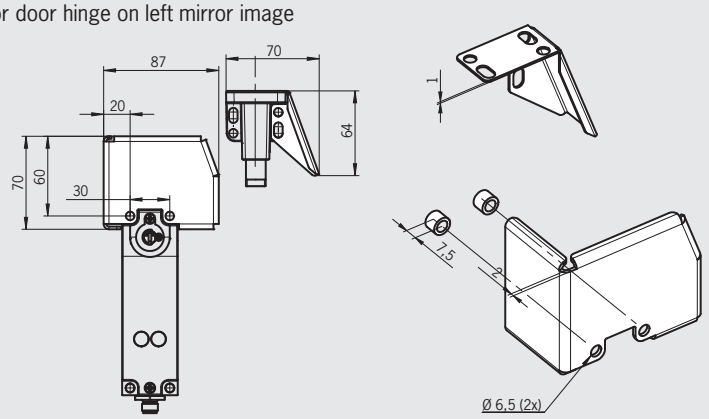
Miscellaneous accessories

- **Cover for read head CET**
- **Double ramp for safety switch CET**

Cover
With the CET cover, tampering with the read head CET is effectively prevented.
The cover prevents the use of simple tools to manually press up the actuator.

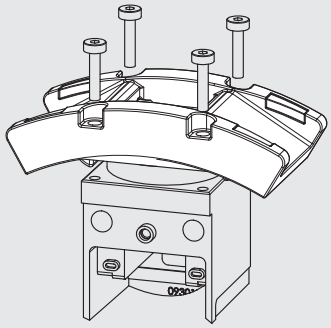
Cover
for read head and actuator CET

Cover for door hinge on left mirror image



Double ramp
The ramp can be approached from two sides. It can be passed over, e.g. for sliding doors.

Double ramp
for read head CET



Ordering table

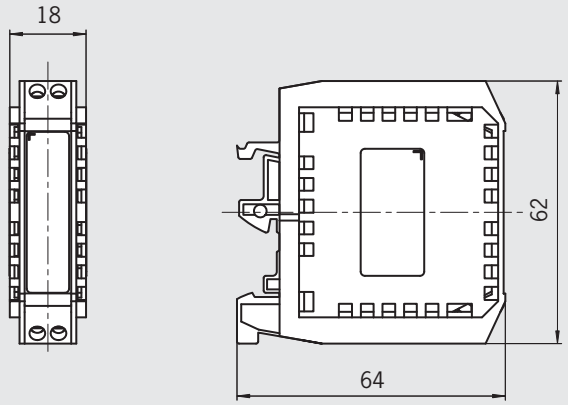
Designation	Use	Version	Order No./item
Cover	for read head CET and actuator CET	door hinge right	**098808** CET cover right
		door hinge left	**098807** CET cover left
Double ramp	for safety switch CET		**114091** Double ramp for CET

▸ Inrush current limiting module PM-SCL

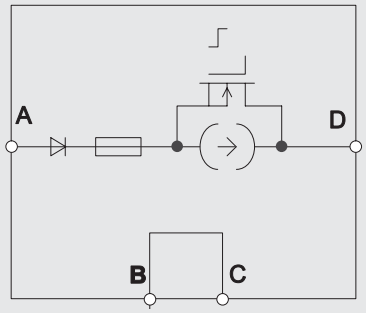
Very high currents are produced on power up if capacitive loads are switched; these currents cause increased wear on electromagnetic switching contacts. The PM-SCL module limits the inrush current for approx. 120 ms and protects the switching contacts.

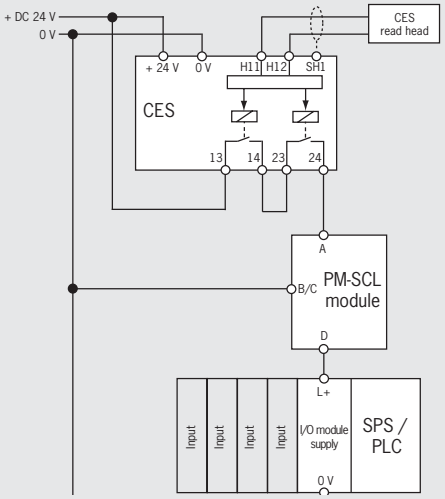
Inrush current limiting module PM-SCL

Dimension drawing



Block diagram and connection example





Ordering table

Designation	Version	Order No./item
Inrush current limiting module PM-SCL	for CES evaluation units	**096945** PM-SCL-096945

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	Polyamide UL 94.V2			
Degree of protection acc. to EN IEC 60529	IP20			
Ambient temperature at U_B = DC 24 V	-20	-	+55	°C
	Atmospheric humidity 80%, not condensing			
Storage temperature	-25	-	+70	°C
Degree of contamination (external, according to EN 60947)	2			
Mounting	Mounting rail 35 mm according to DIN EN 50022 Mounting rail 32 mm according to DIN EN 50035			
Mass	Approx. 0.04			kg
Connection	Connection terminals			
Conductor cross-section	0.14 ... 2.5			mm²
Switching voltage	15	-	40	V DC
Switching current (semiconductor output)	1	-	3,000	mA
Internal fuse (fine-wire fuse 20 x 5 mm)	6.3 A slow blow; breaking capacity min. 1 kA			
Inrush current limiting	60			mA
Duration of limiting (at switch-on voltage 24 V)	75	-	160	ms
Switching frequency	-	-	1	Hz
Load capacitance on which interference can be suppressed (at input voltage 24 V)	-	-	40	µF
Voltage drop after the limiting time has elapsed	-	1.16	-	V
Module current consumption	-	-	20	mA

Non-contact safety system CES-FD-...

- **Evaluation of signals in the field**
- **Connection of CES read heads**
- **Connection to the ET200s and ET200pro**
- **Familiar EUCHNER AP interface**

Functional description
Field evaluation units series CES-FD-AP make it possible to evaluate CES read heads in the field.
The safety outputs on the field evaluation units are connected to the machine control.

The system meets the following safety requirements:

- Safety category 4, PLe according to EN ISO 13849-1
- Redundant design of the circuit in the unit with self-monitoring
- This means that the safety system still functions even if an internal component fails
- The switch state of the semiconductor outputs is continuously monitored internally
- Short circuit detection at the safety outputs by clocked signals

The following switch-on condition applies to the safety outputs FO1A and FO1B:

- Safety guard closed

The system consists of three components:

- coded actuator (transponder),
- field evaluation unit and
- read head.

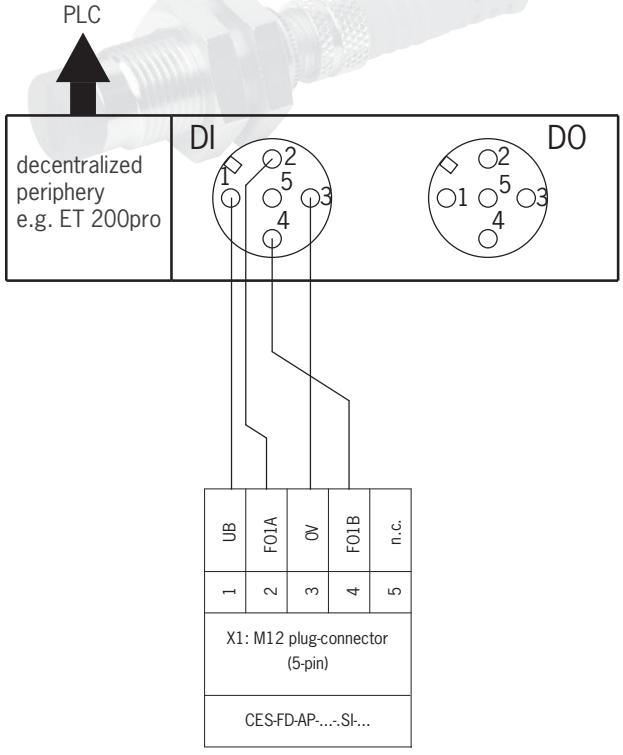
The read head is connected to the field evaluation unit and reads the actuator code.
Every EUCHNER actuator supplied has an electronic coding (unique coding) that is read by the read head. Only if a correct coding is detected does the system accept the actuator. The code in an actuator cannot be reprogrammed.
Unlike systems with unique code detection, on multicode systems a specific code is not requested but instead it is only checked whether the actuator is of a type that can be detected by the system (multicode detection). There is no exact comparison of the actuator code with the code defined in the safety switch (unique code detection).
The read head is fastened to the fixed part of the safety guard.
The actuator attached to the movable part of the safety guard is moved towards the read head by closing the door. The read head is connected to the field evaluation unit. When the switch-on distance is reached, power is supplied to the actuator by the read head by induction and data can be transferred.
If a permissible code is detected, the safety outputs are released.
Due to the combination of dynamic polling of the actuator and the redundant, diverse design of the safety electronics with the two feedback safety outputs, the safety switch will enter the safe state with every detectable fault.
When the safety guard is opened, the safety outputs switch off the safety circuit and the monitoring output OD is switched off. The state of the safety outputs is monitored internally by two microprocessors.

If faults are detected, the safety circuit is switched off and the DIA LED illuminates. In case of devices with a monitoring output OI, the output is switched on.
The field evaluation unit has a redundant switching design with self-monitoring. This means that the safety system is still effective even if a component fails.
The system is designed so that failures will not result in the loss of the safety function. The occurrence of failures is detected by cyclic self-monitoring at the latest on the next demand to switch on the safety outputs (e.g. on starting).
If the safety door with the actuator should settle over time, the actuator can drift out of the read head operating distance. The device recognizes this situation and indicates that the actuator is in the limit range. This allows the safety door to be readjusted in time.

Your advantages

- Maximum safety with cat. 4/PLe
- Minimal wiring effort
- Small space requirement
- No additional DIN rail mounted evaluation unit required

Direct connection to decentralized peripheral systems (e.g. ET200pro)



Connection example:
Version for connection to decentralized peripheral equipment

Connection to safe control systems or safety relays
Do not use a control system or safety relay with pulsing for monitoring short circuits or switch off the pulsing function in these devices. The switch generates its own clock signals on the output lines FO1A/FO1B. A downstream device must tolerate these test pulses, which may have a length of up to 0.4 ms.
The inputs on the downstream device must be suitable for positive-switching devices (pnp outputs), as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.

Field evaluation unit

1

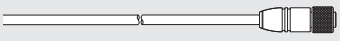
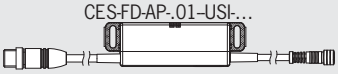
Cat. 4 / PLe

CES-FD-AP-.-01-USI-...
- No series connection
- Pulsing for short circuit detection
- Available in the unicode and multicode variants

(see page 82)

Read head		Actuator	
	**CES-A-LMN-SC** ▸ Cylindrical design M12 ▸ M8 plug connector (see page 84)		**CES-A-BMB** ▸ Cylindrical design M12 (see page 86)
	**CKS-A-L1B-SC-113130** ▸ Key adapter for installation in control panels ▸ M8 plug connector (see page 87)		**CKS-A-BK1-RD-113461** ▸ Key for key adapter CKS (see page 87)

Component overview for the non-contact safety system CES-FD...

Extension cables	Field evaluation unit	Read heads	Actuator	Bolt
 page 82	CES-FD-AP-.01–USI-...  page 82	CES-A-LMN-SC  page 84	CES-A-BMB  page 86	-
		CKS-A-L1B-SC-113130  page 87	CKS-A-RD-113461  page 87	-

Possible combinations for CES components

To give you a quick overview of which CES components can be combined with each other, there is a combination 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-FD

Field evaluation unit	Read head	Actuator	
		CES-A-BMB 077791	**CKS-A-BK1-RD** 113461
CES-FD-AP-.-01-USI-...	**CES-A-LMN-SC** 077790	5	
	CKS-A-L1B-SC 113130		-

Field evaluation unit CES-FD-AP-...

- **Evaluation of signals in the field**
- **Connection of CES read heads**
- **Connection to the ET200s and ET-200pro**
- **Familiar EUCHNER AP interface**

For possible combinations see page 81

Short circuit monitoring
The switch generates its own clock signal on the output lines FO1A/FO1B.
Pay attention to this aspect when connecting to control systems and relays.

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

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 (FO1A and FO1B) must be evaluated.

LED indicator
STATE Status LED
DIA Diagnostics LED

Field evaluation unit CES-FD-AP-... Cat. 4 / PLe

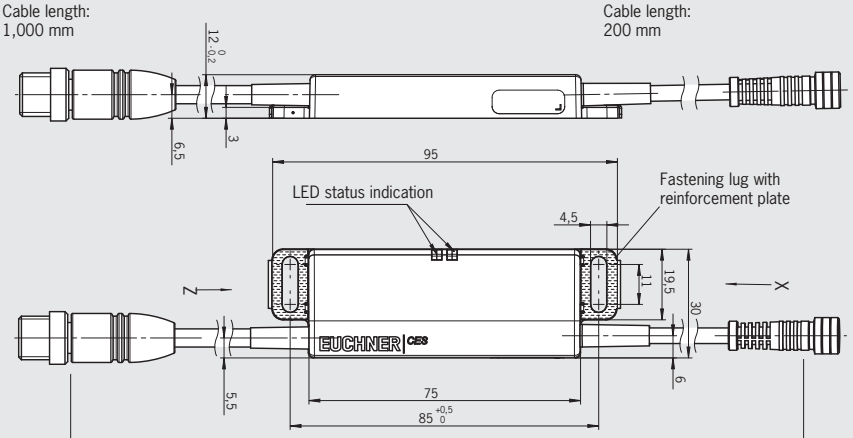
Dimension drawing

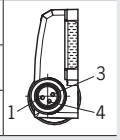
Connection cable for control system
with M12 plug connector, 5-pin

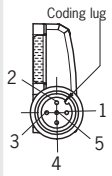
Cable length:
1,000 mm

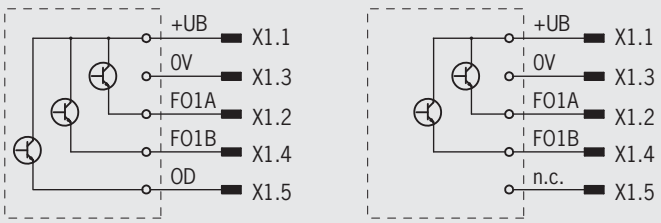
Connection cable for read head
with M8 plug connector, 3-pin

Cable length:
200 mm



Pin	Designation	Description	Wire color	M8 plug connector, 3-pin
1	H1	Data wire	BN	
3	H2	Data wire	WH	
4	SH	Screen	-	

M12 plug connector 5-pin	Pin 5-pin	Pin 5-pin, pin 5 not used	Designation	Description	Wire color
	1	1	UB	Power supply DC 24 V	BN
	2	2	FO1A	Safety output, channel 1	WH
	3	3	0V	Ground DC 0 V	BU
	4	4	FO1B	Safety output, channel 2	BK
	5	-	OD	Monitoring output	GY



Safety screws see page 89. Connection cables see page 156 ff.

Ordering table

Series	Category and PL acc. to EN ISO 13849-1	Version	Order no./item
CES-FD-AP-U-01-... Unicode	4 / PL e	Connection cable with M12 plug connector, pin 5 not assigned	**119865** CES-FD-AP-U-01-USI-119865
CES-FD-AP-M-01-... Multicode	4 / PL e	Connection cable with M12 plug connector, pin 5 not assigned	**115534** CES-FD-AP-M-01-USI-115534
Connection cable with M12 plug connector, 5-pin		5 m, PVC	**100183**
		10 m, PVC	**100184**
		20 m, PVC	**100185**
Extension for read head cable with M8 plug connector, 3-pin		0.4 m, PUR	**115464**

Technical data for field evaluation unit CES-FD-AP-...

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic PBT		
Dimensions		95 x 30 x 12		mm
Mass		0.04		kg
Ambient temperature at U_B = DC 24 V				°C
- With connection cable with M12 plug connector				
- Connection cable laid rigidly	-20	-	+65	
- Connection cable movable	-0	-	+65	
Storage temperature	-20	-	+70	
Degree of protection		IP67		
Safety class		III		
Degree of contamination		3		
Installation position		any		
Connection - Evaluation - Read head		Connection cable with plug connector M12x1, 5-pin Connection cable with plug connector M8x1, 3-pin		
Operating voltage U_B (reverse polarity protected, regulated, residual ripple < 5%) [1]		24 ± 15% (PELV)		V DC
Current consumption		45		mA
Switching load according to cULus		DC 24 V, class 2		
External fuse (operating voltage)	0.25	-	1.5	A
Safety outputs FO1A/FO1B		Semiconductor outputs, p-switching, short circuit-proof		
- Output voltage U(FO1A)/U(FO1B) [2]				V DC
HIGH U(FO1A)	U_B-1.5	-	U_B	
HIGH U(FO1B)	U_B-1.5	-	U_B	
LOW U(FO1A)/U(FO1B)	0		1	
Switching current per safety output	1	-	150	mA
Utilization category according to EN 60947-5-2		DC-13 24 V 150 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads.		
Off-state current I_r		≤ 0.25		mA
Monitoring output OD [2]		Semiconductor output p-switching, short circuit-proof		
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	50	mA
Rated insulation voltage U_i	-	-	75	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Resilience to vibration		acc. to EN IEC 60947-5-2		
Switching frequency	-	-	1	Hz
Repeat accuracy R		≤ 10		%
EMC protection requirements		according to EN 60947-5-3		
Reliability values according to EN ISO 13849-1				
Category		4		
Performance Level (PL)		e		
PFH_d		4.5×10^{-9} / h		
Mission time		20		years

1) The device tolerates voltage interruptions of up to 5 ms.
2) Values at a switching current of 50 mA without taking into account the cable lengths.

Read head CES-A-LMN-SC

- **Cylindrical design M12**
- **M8 plug connector (snap-action and screw terminals)**

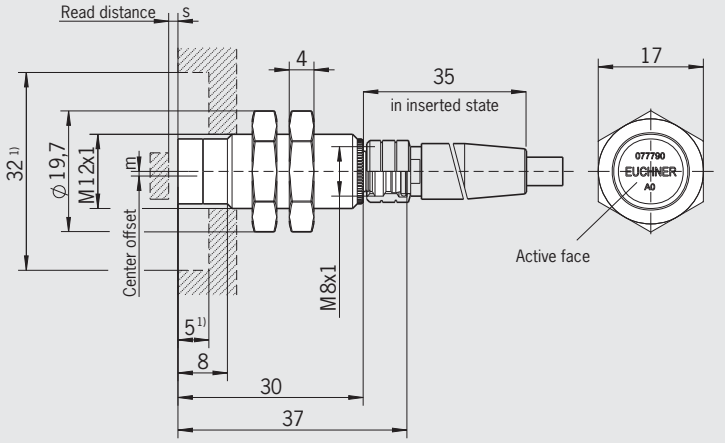
For possible combinations see page 81

Attention:
The operating distance may vary depending on the substrate material and installation situation.

Important:
Actuators must be ordered separately! See page 86.

Read head CES-A-LMN-SC
M8 plug, 3-pin

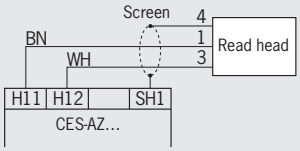
Dimension drawing



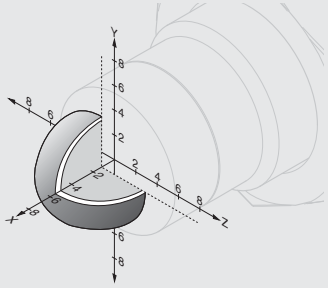
1) Metal-free zone

For connection cable see page 82

Terminal assignment



Typical operating distance



A minimum distance of s = 1.2 mm must be maintained.

Ordering table

Series	Connection	Version	Order no./item
CES-A-LMN-SC	**SC** M8 plug connector	Housing M12	**077790** CES-A-LMN-SC

Technical data for read head CES-A-LMN-SC (in combination with CES-FD)

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Nickel-plated CuZn housing sleeve Plastic PBT GF20 cap			
Dimensions	M12 x 1, length 38			mm
Mass	0.2			kg
Ambient temperature				°C
- CES-A-LMN-SC	-20	-	+70	
Ambient pressure (only of active face in installed condition)	-	-	10	bar
Degree of protection	IP67			
Installation position	Any			
Method of operation	Inductive			
Power supply	Via evaluation unit			
Cable length	-	-	0.7	m
In combination with actuator CES-A-BMB				
Operating distance for center offset m = 0 [1]				mm
- Assured switch-off distance S_{ar}	-	-	10	
Cable length l = 0 to 15 m				
- Switch-on distance	-	5	-	
- Assured switch-on distance S_{ao}	3.4	-	-	
- Switching hysteresis	0.05	0.2	-	
Connection	M8 plug connector (snap-action and screw terminals), 3-pin			

1) These values apply to surface installation of the read head in steel.

Actuator CES-A-BMB

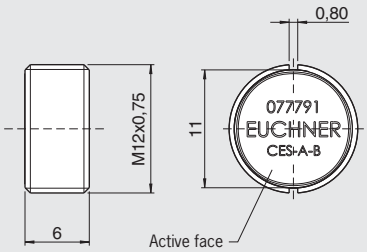
- **Cylindrical design M12 x 0.75**

For possible combinations see page 81

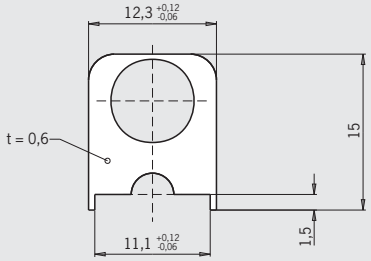
Insertion tool
With the aid of the insertion tool, the actuator CES-A-BMB (cylindrical design) can be screwed into a prepared M12 x 0.75 thread in the safety door.

Actuator CES-A-BMB

Dimension drawing



Insertion tool



Ordering table

Series	Comment	Version	Order no./item
CES-A-BMB			**077791** CES-A-BMB
Insertion tool		For actuator CES-A-BMB	**037662**

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Stainless steel		
Dimensions		M12 x 0.75, depth 6		mm
Mass		0.002		kg
Ambient temperature	-25	-	+70	°C
Ambient pressure (only applies if the pressure acts on all sides of the actuator)	-	-	10	bar
Degree of protection		IP67		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

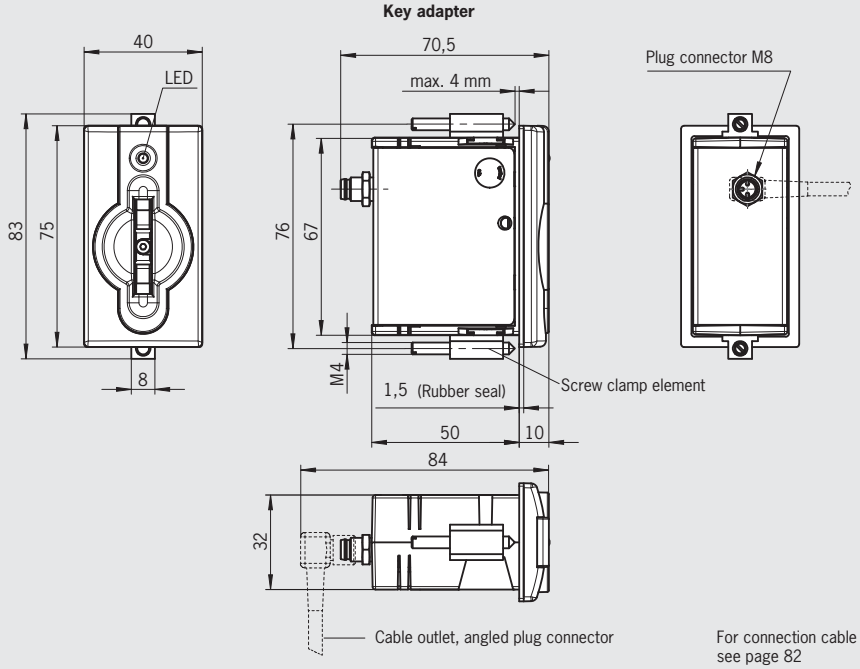
Key adapter CKS

- **Key adapter with integrated CES read head**
- **LED indicator**
- **Simple connection via M8 plug connector**
- **High degree of protection IP67**

For possible combinations see page 81

Key adapter CKS

Dimension drawing

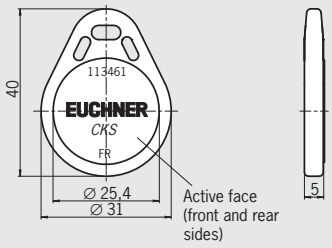


Key CKS

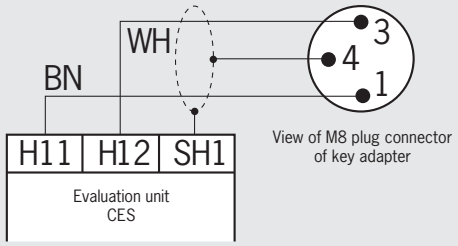
Important: Key adapter CKS must not be used as a lockout mechanism in combination with multicode evaluation.

The key is not included with the key adapter and must be ordered separately.

Dimension drawing



Wiring diagram



Ordering table

Series	Version	Order no./item
CKS-A-L1B-SC-113130	Key adapter CKS (including screw clamp elements)	**113130** CKS-A-L1B-SC-113130
CKS-A-BK1-RD-113461	Key CKS (color red)	**113461** CKS-A-BK1-RD-113461

Technical data for key adapter CKS (in combination with CES-FD)

Parameter	Value min.	Value typ.	Value max.	Unit
Key adapter				
Housing material		Plastic (PA 6 GF30)		
Mass		0.13		kg
Ambient temperature	-20	-	+70	°C
Degree of protection according to IEC 60529		IP67 (in installed state)		
Installation position		On the front		
Mounting cut-out according to DIN 43700		33 x 68		mm
Operating distance [1]				mm
Assured switch-off distance s_{ar}	-	-	35	
Assured switch-on distance s_{ao}	2	-	-	
Switching hysteresis	-	1	-	
Connection to evaluation unit		Plug connector M8 (male socket, 3-pin)		
Cable length	-	-	0.7	m
LED indicator		white: valid key detected		
Key				
Housing material		Plastic (PC)		
Mass		0.004		kg
Degree of protection according to IEC 60529		IP67		
Ambient temperature	-20	-	+70	°C
Power supply		Inductive via read head		

1) Referred to the stop of the inserted key

Safety screws

Ordering table

Fixing material/ screw size	Version/usage	Packaging unit [qty.]	Order no.
Safety screws **M4 x 14** (large head)	Field evaluation unit CES-FD-AP-M-01-USI-115534	100	**086232**

Non-contact safety switches CES-A-C5.../ CES-A-W5...

- **Standard housing according to IEC/EN 60947-5-2, IP67**
- **Read head and evaluation electronics integrated in housing**
- **Semiconductor output**
- **Connection of the safety circuit using M12 plug connector**
- **Unicode and multicode switches**

Functional description
The Coded Electronic Safety switch CES consists of two components:

- Coded actuator
- Safety switch

The device described in this section is integrated with the read head in a standard housing according to IEC/EN 60947-5-2.

Thanks to the high degree of protection IP67, this switch can be used directly on the safety guard in a very harsh environment. Semiconductor technology allows for a compact design of the evaluation unit and wear-free switching with a theoretically unlimited number of operating cycles.
The information from the coded actuator is read by the device and processed at the same point. The transfer of static signals (information on whether door open or closed) to the higher level switchgear permits the use of connecting cables up to 300 m long with the system.
Serial wiring, i.e. the cascading of several devices, is possible. This feature makes it possible for you to implement decentralized wiring concepts with the safety switch CES.
Specifically, the major advantage of the system is that the positioning of the evaluation electronics directly at the safety guard saves space in the control cabinet.
The system operator can read the current state of the safety switch on the two LED indicators (one with double function). If the actuator is in the operating distance, the OUT LED illuminates yellow. Even a possible fault in the device is indicated by a red LED. If servicing is required, the safety switch connected with an M12 plug connector can be replaced in seconds.
The required approach direction can also be set quickly on the compact housing. After two fastening screws have been undone, the active face of the read head can be set in 5 different positions.

The safety switches have a relatively large operating distance of 20 mm. Compared with mechanical safety switches, the assembly of the unit is much easier and the need for precision in the door guide is also reduced considerably. Therefore the assembly and maintenance costs are much lower.

The safety switch is fastened to the fixed part of the safety guard.
The actuator attached to the movable part of the safety guard is moved towards the read head fitted in the safety switch by closing the door. When the switch-on distance is reached, power is supplied to the actuator by the inductive read head and data can be transferred.

The bit pattern read is compared with the code saved in the device; if the data matches, the safety outputs (semiconductor outputs) are enabled and the monitoring output (semiconductor output) is also set HIGH.
Due to the combination of dynamic polling of the actuator and the redundant, diverse design of the safety electronics with the two feedback safety outputs, the device will enter the safe state with every detectable fault.
When the safety guard is opened, the safety outputs switch off the safety circuit and the monitoring output (OUT) is switched LOW. The state of the safety outputs is monitored internally by two microprocessors.
On an internal fault in the device, the safety circuit is switched off and the OUT/ERROR LED illuminates red.
The device has a redundant circuit design with self-monitoring. This means that the safety system is still effective even if a component fails.

Your advantages
- Relocation of the evaluation electronics from the control cabinet to the system
  - Space saving in the control cabinet
  - Decentralized wiring concept possible
- Connection to safe control systems
- Serial connection of up to 3 devices in succession
- Connection via M12 plug connector
  - Prevention of wiring errors
- Easy adjustment of the read head in 5 approach directions
- Short circuit-proof monitoring and safety outputs
  - High reliability
- Large operating distance of 20 mm with additional hysteresis
  - Large mechanical tolerances possible for door guide
- Flush installation in door panel is possible
- Approved by DGUV and UL (Canada and USA)

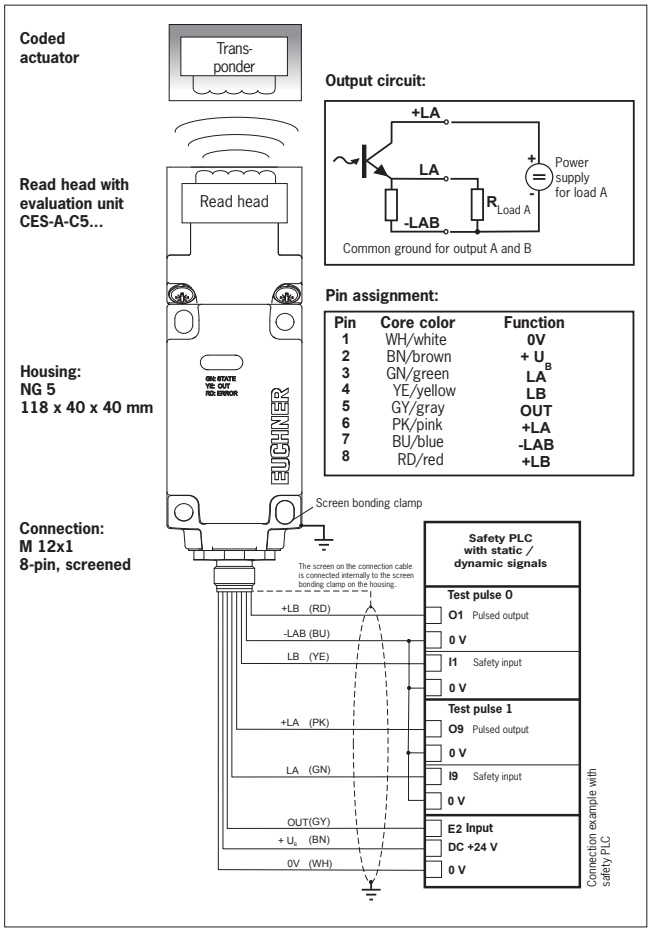
Reading and evaluating directly on site

The compact safety switches in the system family CES-A… combine read head and evaluation unit in one housing. The switches have two safety outputs and one monitoring output. All outputs are semiconductor outputs.

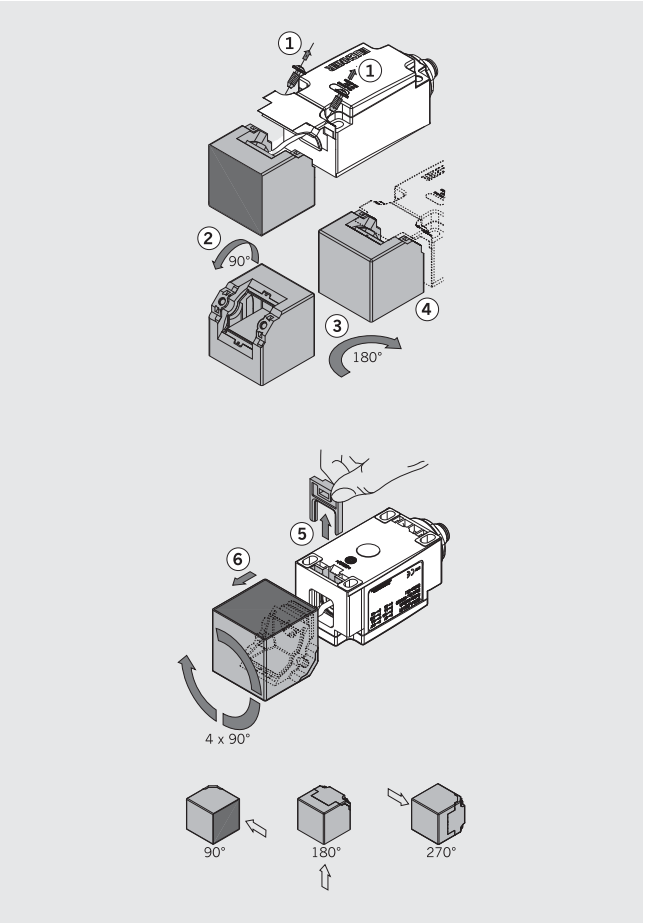
Switching pulsed signals

The safety outputs can switch pulsed signals, e.g. from a safe control system or a safety relay. Up to three safety outputs can be connected in series.

Connection example CES-A-C5…/CES-A-W5…

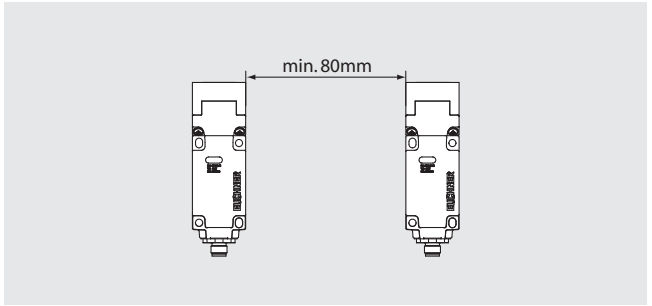


Changing the approach direction



Mounting

When mounting several safety switches, observe the stipulated minimum distance to avoid mutual interference.



Safety switches

C05
Cat. 3 / PLe

CES-A-C5E-01
- Category 3 according to EN ISO 13849-1
- PL e according to EN ISO 13849-1
- Available in the unicode variant

(see page 98)

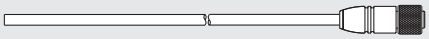
C05
Cat. 4 / PLe

CES-A-C5H-01 / CES-A-W5H-01
- Category 4 according to EN ISO 13849-1
- PL e according to EN ISO 13849-1
- Available in the unicode and multicode variants

(see page 98)

Actuator	
	**CES-A-BBA** ▸ Cube-shaped (see page 101)
	**CES-A-BCA** ▸ Cube-shaped (see page 101)
	**CES-A-BPA** ▸ Square (see page 102)

Component overview for non-contact safety switches CES-A-C.../CES-A-W.../CES-A-S...

Connection cable/mating connector	Safety switch	Actuator	Bolt
 page 103	CES-A-C5... CES-A-W5...  page 98	CES-A-BBA  page 101 CES-A-BCA  page 101 CES-A-BPA  page 102	page 229/230

Possible combinations for CES components

To give you a quick overview of which CES components can be combined with each other, there is a combination 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-A-.5

Safety switch	Actuator		
	CES-A-BBA 071840	**CES-A-BCA** 088786	**CES-A-BPA** 098775
CES-A-C5E-01 077750	20	20	30
CES-A-C5H-01 091458	20	20	30
CES-A-W5H-01 097525	20	20	30

Non-contact safety switches CES-A-C5.../CES-A-W5...

- **Read head with integrated evaluation electronics**
- **Possible to switch pulsed signals**
- **2 safety outputs (semiconductor outputs)**
- **Up to category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 97

Approach direction
Can be adjusted in 90° steps

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

Category according to EN ISO 13849-1
Due to two redundant design semiconductor outputs (safety outputs) with internal monitoring suitable for:
- CES-A-C5E-01, category 3 / PL e according to EN ISO 13849-1
- CES-A-C5H-01/CES-A-W5H-01, category 4 / PL e according to EN ISO 13849-1

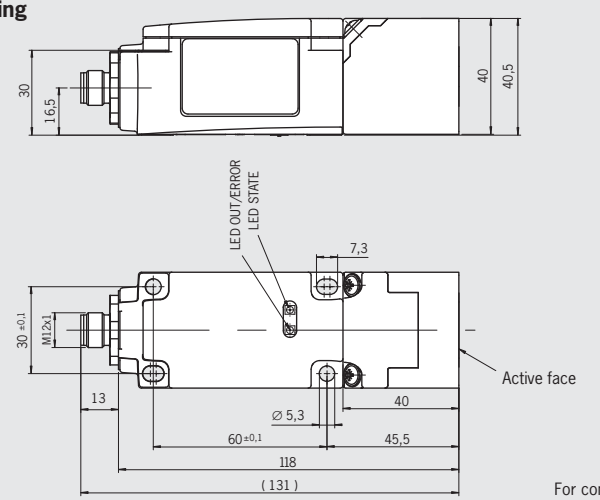
LED indicator
STATE Status LED
OUT/ERROR Safety output status/diagnostics LED (combined)

Additional connections
OUT Monitoring output (semiconductor)

Attention:
The operating distance may vary depending on the substrate material and installation situation.

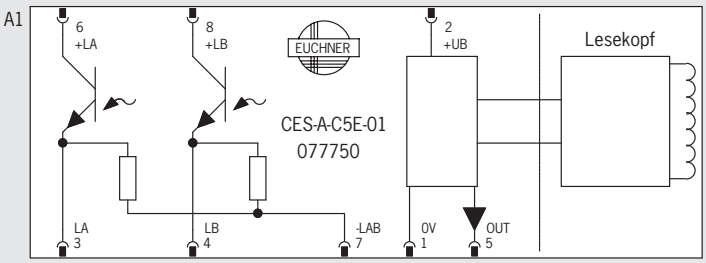
Non-contact safety switches CES-A-C5.../CES-A-W5...
M12 plug, 8-pin
Cat. 3/4 PLe

Dimension drawing



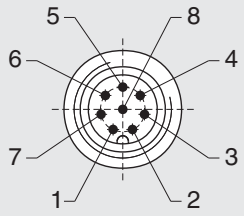
For connection cable see page 103

Block diagram



Terminal assignment

1	0 V	5	OUT
2	+ UB	6	+ LA
3	LA	7	-LAB
4	LB	8	+LB



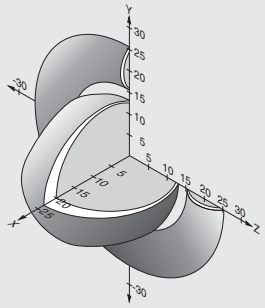
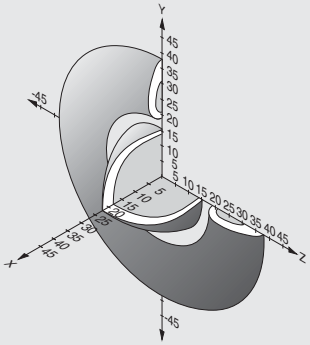
View on the connection side of the safety switch

The screen on the connection cable is connected internally to the safety switch screen bonding clamp via the knurled nut on the M12 plug connector.

Ordering table

Series	Category and PL acc. to EN ISO 13849-1	Version	Order no./item
CES-A-C5... Unicode	3 / PL e		**077750** CES-A-C5E-01
	4 / PL e		**091458** CES-A-C5H-01
CES-A-W5... Multicode	4 / PL e		**097525** CES-A-W5H-01

Typical operating distances

Actuator	Safety switch CES-A-C5... CES-A-W5...
CES-A-BBA page 101 **CES-A-BCA** page 101	 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 102	 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.

Technical data for non-contact safety switches CES-A-C5…/CES-A-W5…

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic PBT V0 GF30		
Dimensions		according to EN 60947-5-2		mm
Mass		0.4		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, screen can be applied		
Operating voltage U_B (regulated, residual ripple < 5%)	18	24	27	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		max. DC 24 V, class 2		
External fuse (operating voltage U_B)	0.25	-	8	A
Power supply for load U(+LA)/U(+LB)	18	-	27	V DC
Safety outputs (LA/LB, 2 semiconductor outputs, p-switching, short circuit proof, electrically decoupled)				
- Output voltage U(LA/U(LB) [1]				
HIGH U(LA)	U(+LA) - 1.5	-	U(+LA)	V DC
HIGH U(LB)	U(+LB) - 1.5	-	U(+LB)	
LOW U(LA)/U(LB)	0	-	1	
Switching current per safety output	1	-	400	mA
External fuse (U(+LA)/U(+LB), safety circuit		400 mA medium slow-blow		
Utilization category according to EN 60947-5-2		DC-13 24V 400mA		
Monitoring output (OUT, semiconductor output, p-switching, short circuit-proof)				
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	20	mA
Rated insulation voltage U_i	-	-	300 [2]	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Rated conditional short-circuit current		100		A
Resilience to vibration		according to EN 60947-5-2		
Switching delay from state change [3]	-	-	180	ms
Difference time between the two safety outputs	-	-	120	ms
Ready delay [4]	-	-	3	s
Dwell time [5]	0.5	-	-	s
Switching frequency	-	-	1	Hz
Repeat accuracy R acc. to EN IEC 60947-5-3		≤ 10		%
Mounting distance between 2 switches or 2 actuators	80	-	-	mm
EMC protection requirements		according to EN 60947-5-3		
In combination with actuator CES-A-BBA/CES-A-BCA				
Operating distance for center offset m = 0				
- Switch-on distance	-	20	-	mm
- Assured switch-on distance s_{ao} [6]	18	-	-	
- Switching hysteresis [5]	2	3	-	
- Assured switch-off distance s_{ar}	-	-	40	
In combination with actuator CES-A-BPA				
Operating distance for center offset m = 0				
- Switch-on distance	-	22 [7]	-	mm
- Assured switch-on distance s_{ao}	15	-	-	
- Switching hysteresis [6]	1	2	-	
- Assured switch-off distance s_{ar}	-	-	58	
LED indicators	STATE OUT/ERROR OUT/ERROR	LED green: flashing: LED yellow: LED red:	Normal operation Teach-in operation Actuator detected - EMC interference - Internal electronics fault - Invalid teach-in operation	

Reliability values according to EN ISO 13849-1	CES-A-C5E-…	CES-A-C5H-…/CES-A-W5H-…	
Category	3	4	
Performance Level (PL)	e	e	
PFH_d	4.29 x 10^{-8}/h	3.7 x 10^{-9}/h [8]	
Mission time	20	20	years

1) Values at a switching current of 50 mA without taking into account the cable length.
2) Tested by German Social Accident Insurance up to 75 V.
3) 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.
4) After the operating voltage is switched on, the semiconductor outputs are switched off and the monitoring outputs are set LOW during the ready delay.
5) The dwell time of an actuator inside and outside the operating distance must be at least 0.5 s to ensure reliable detection of internal faults in the evaluation unit (self-monitoring).
6) Values apply to surface installation of the actuator.
7) On surface mounting on aluminum; in a non-metallic environment the typical switching distance increases to 30 mm.
8) Applying the limit value from EN ISO 13849-1:2008, section 4.5.2 ($MTTF_d$ = max. 100 years), the German Social Accident Insurance certifies a PFH_d of 2.47 x 10^{-8}.

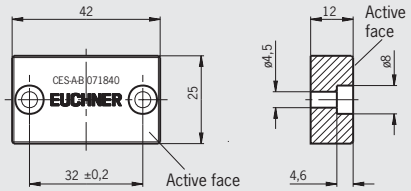
Actuator CES-A-BBA/CES-A-BCA

- **Cube-shaped design**
  42 x 25 mm

For possible combinations see page 97

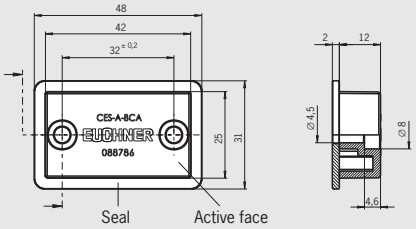
Actuator CES-A-BBA (Fortron)

Dimension drawing



2 safety screws
M4x14 included

Actuator CES-A-BCA (PE-HD)
Housing material PE-HD



2 safety screws
M4x14 included

Ordering table

Series	Comment	Version	Order no./item
CES-A-BBA	2 safety screws M4 x 14 included	-	**071840** CES-A-BBA
CES-A-BCA	2 safety screws M4 x 14 included Flat seal included	Housing material PE-HD [1]	**088786** CES-A-BCA

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

Technical data

Parameter	Value min.	Value typ.	Value 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)	Fluoro rubber 75 FPM 4100			
Dimensions	42 x 25 x 12			mm
Mass	0.02			kg
Ambient temperature				°C
- CES-A-BBA	-25	-	+70	
- CES-A-BCA	-25	-	+50	
Degree of protection	IP67/IP69K			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

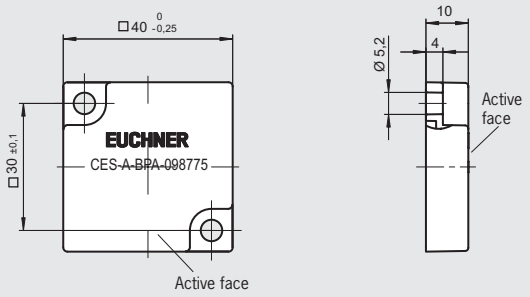
Actuator CES-A-BPA

- **Cube-shaped design**
  40 x 40 mm

For possible combinations see page 97

Actuator CES-A-BPA

Dimension drawing



2 safety screws
M5x10 included

Ordering table

Series	Comment	Version	Order no./item
CES-A-BPA	2 safety screws M5 x 10 included	-	**098775** CES-A-BPA

Technical data

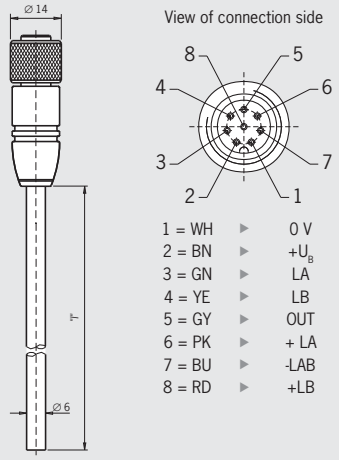
Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		PPS		
Mass		0.025		kg
Degree of protection according to IEC 60529		IP67/IP69K		
Ambient temperature	-25	-	+70	°C
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

Connection cables with plug connectors

- **Connection cable for safety switch CES-A-C5.../CES-A-W5...**

For CES-A-C5.../CES-A-W5...
M12 plug, 8-pin, silicone-free

Dimension drawing



Ordering table

Use	Plug connector	Type of cable	Cable length [m]	Order no./item
For CES-A-C5...	Straight	V PVC cable	5	**077751** C-M12F08-08X025PV05,0-MW-077751
			10	**077752** C-M12F08-08X025PV10,0-MW-077752
			15	**077753** C-M12F08-08X025PV15,0-MW-077753
			20	**077871** C-M12F08-08X025PV20,0-MW-077871
			25	**077872** C-M12F08-08X025PV25,0-MW-077872
			50	**077873** C-M12F08-08X025PV50,0-MW-077873

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector	8-pin M12 female connector, straight			
Connection	Screw terminal, knurled nut electrically connected to cable screen			
Conductor cross-section	8 x 0.25 screened			mm²
Material, outer sheath	PVC			
Cable length	Max. 300 (taking into account the voltage drop due to the cable resistance, see table)			m

Voltage drop as a function of switching current and cable length (examples)

Switching current [mA]	Cable length "l" [m]	Voltage drop Output [V]	Max. voltage drop Cable [V]	Max. voltage drop Total [V]
6 (safety control system with pulsed signals)	1 -100	1.4	0.1	1.5
	101 - 300	1.4	0.4	1.8
50 (safety relay)	1 - 15	1.5	0.2	1.7
	16 - 50	1.5	0.5	2.0
	51 - 100	1.5	1.0	2.5
	101 - 300	1.5	3.0	3.5
400 (e.g. small contactor)	1 - 15	1.7	1.2	2.9
	16 - 50	1.7	4.0	5.7
	51 - 100	1.7	8.0	9.7
	101 - 300	1.7	-	-

Safety screws

Ordering table

Fixing material/ screw size	Version/usage	Packaging unit [qty.]	Order no.
Safety screws **M4 x 14** (small head)	Actuator CES-A-BBA, CES-A-BCA	20	**071863**
Safety screws **M5 x 10**	Actuator CES-A-BPA	100	**073455**

Non-contact safety switches CES-AH-...

- **Read head and evaluation electronics integrated in one housing**
- **Semiconductor output**
- **Safety outputs for directly switching up to 4 A**
- **Connection of the safety circuit using M23 plug connector**

Functional description
The Coded Electronic Safety switch CES consists of two components:

- Coded actuator
- Safety switch

In the case of the devices described in this section the read head and the evaluation electronics are integrated in one housing.

Thanks to the high degree of protection IP67, this switch can be used directly on the safety guard in a very harsh environment. Semiconductor technology allows for a compact design of the evaluation electronics and wear-free switching with a theoretically unlimited number of operating cycles.
Devices in the system family CES-AH-... have special safety outputs that are suitable for the direct switching of large loads. In appropriate applications it is therefore not necessary to connect power relays or contactors in between.
The information on the coded actuator is read by the device and processed at the same point. The transfer of static signals (information on whether door open or closed) to the higher level switchgear permits the use of connecting cables up to 50 m long with the system.
Serial wiring, i.e. the cascading of several devices, is possible. This feature makes it possible for you to implement decentralized wiring concepts with the safety switch CES.
Specifically, the major advantage of the system is that the positioning of the evaluation electronics directly at the safety guard saves space in the control cabinet.
The system operator can read the current state of the safety switch on the two LED indicators (one with double function). A possible fault in the device is indicated by a red LED. If servicing is required, the safety switch connected with an M23 plug connector can be replaced in seconds. EUCHNER supplies a corresponding mating connector (see sub-section *Accessories* in this section).

The safety switches have a relatively large operating distance of up to 27 mm depending on the actuator. Compared with mechanical safety switches, the assembly of the unit is much easier and the need for precision in the door guide is also reduced considerably. Therefore the assembly and maintenance costs are much lower.

The safety switch is fastened to the fixed part of the safety guard.
The actuator attached to the movable part of the safety guard is moved towards the read head fitted in the safety switch by closing the door. When the switch-on distance is reached, power is supplied to the actuator by the inductive read head and data can be transferred.

The bit pattern read is compared with the code saved in the device, if the data match the safety outputs are enabled (semiconductor outputs). A feedback loop can also be integrated here.
For the safety outputs to switch on, there must be a voltage of U_B on the START input. This voltage can be supplied either using a jumper (automatic start) or using a start button.
Due to the combination of dynamic polling of the actuator and the redundant, diverse design of the safety electronics with the two feedback safety outputs, the device will enter the safe state with every detectable fault.
The safety outputs shut down the safety circuit if the safety guard is opened. The state of the safety outputs is monitored internally by two microprocessors.
To check the safe switching function, the safety outputs LA and LB are shut down for approx. 6 ms at regular intervals. The loads connected must tolerate these pulses. Using these pulses a dangerous short circuit from 24 V to the outputs LA and LB is also detected. In the event of a fault, the safety outputs are switched off and the DIA LED illuminates red. Two LED indicators (with varying sequence of flashes) on the device make possible quick diagnostics.
The device has a redundant circuit design with self-monitoring. This means that the safety system is still effective even if a component fails.
A dangerous short circuit between the outputs LA and LB is not detected by the safety switch. In certain circumstances, however, it is possible to exclude a failure as per EN 13849-1 section 7.3 (laying connection cables with protection).

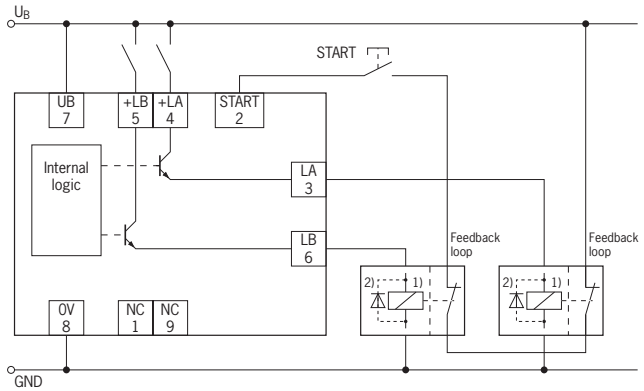
Your advantages
- Relocation of the evaluation electronics from the control cabinet to the system
  - Space saving in the control cabinet
  - Decentralized wiring concept possible
- Direct switching of larger loads
- Connection via M23 plug connectors
  - Prevention of wiring errors
- Short circuit-proof safety outputs
  - High reliability
- Large operating distance of up to 27 mm depending on actuator with additional hysteresis
  - Large mechanical tolerances possible for door guide

Reading and evaluating directly on site

The compact safety switches in the system family CES-AH-... combine read head and evaluation unit in one housing. The switches have two safety outputs. All outputs are semiconductor outputs.

Connection example CES-AH-...

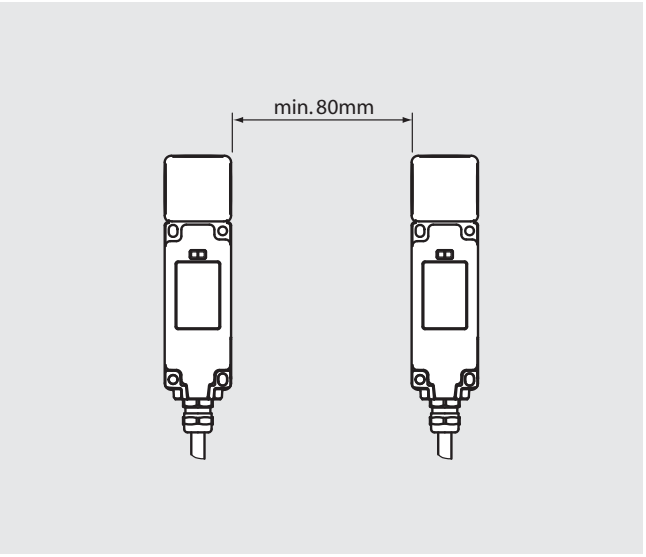
Within the device, the shutdown of the two outputs LA and LB is dual-channel. As such, each of the outputs represents a separate safety output.



1) Load, e.g. valve coil, DC motor, Ohmic load, etc.
2) In case of inductive loads, it is imperative free-wheeling diodes are used to protect the outputs on the safety switch.

Mounting

When mounting several safety switches, observe the stipulated minimum distance to avoid mutual interference.



Safety switch

C03

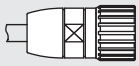
Cat. 3 / PLd

CES-AH-C03-...
- Load current of 4 A can be switched directly
- Category 3 according to EN ISO 13849-1
- PL d according to EN ISO 13849-1
- Available in the unicode variant

(see page 114)

Actuator	
	**CES-A-BBA** ▸ Cube-shaped (see page 117)
	**CES-A-BCA** ▸ Cube-shaped (see page 117)
	**CES-A-BPA** ▸ Square (see page 118)
	**CES-A-BRN** ▸ Cube-shaped (see page 119)

Component overview for non-contact safety switches CES-AH

Connection cable/mating connector	Safety switch	Actuator	Bolt
 page 120	CES-AH-C03-...  page 114	CES-A-BBA  page 117 CES-A-BCA  page 117 CES-A-BPA  page 118 CES-A-BRN  page 119	-

Possible combinations for CES components

To give you a quick overview of which CES components can be combined with each other, there is a combination 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-AH

Safety switch	Actuator			
	CES-A-BBA 071840	**CES-A-BCA** 088786	**CES-A-BPA** 098775	**CES-A-BRN-100251** 100251
CES-AH-C03-...	20	20	22	27

Non-contact safety switches CES-AH-C03-...

- **Read head with integrated evaluation electronics**
- **Load currents of 4 A can be switched directly**
- **2 safety outputs (semiconductor outputs)**
- **Category 3 / PL d according to EN ISO 13849-1**

For possible combinations see page 113

Approach direction
Side, cannot be changed (see dimension drawing).

Available coding options (see page 5)
- Unicode evaluation

Category according to EN ISO 13849-1
Due to two redundant design semiconductor outputs (safety outputs) with internal monitoring suitable for:
- Category 3 / PL d according to EN ISO 13849-1

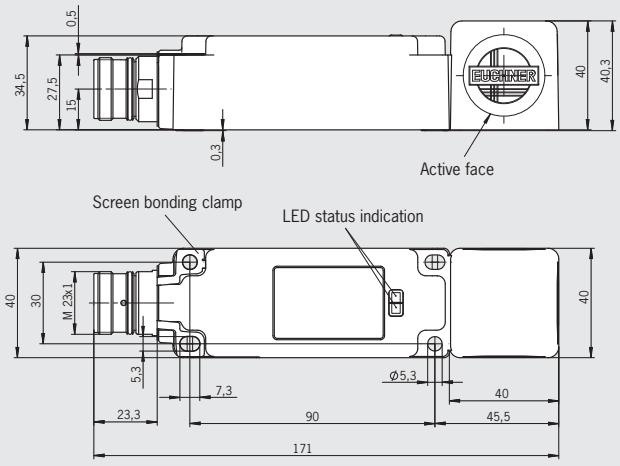
Each safety path is independently safe.

LED indicator
STATE Status LED
DIA Diagnostics LED

Attention:
The operating distance may vary depending on the substrate material and installation situation.

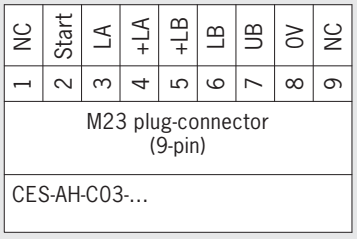
Non-contact safety switches CES-AH-C03-...
M23 plug, 9-pin
Cat. 3 / PLd

Dimension drawing

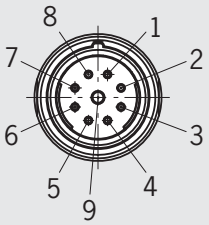


Plug connectors see page 120

Block diagram



Terminal assignment



View on the connection side of the safety switch

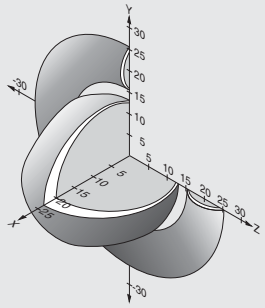
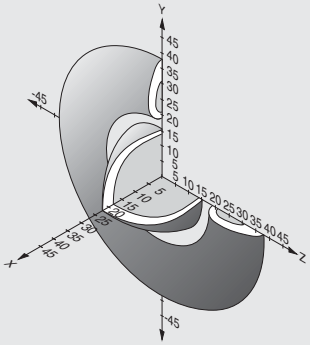
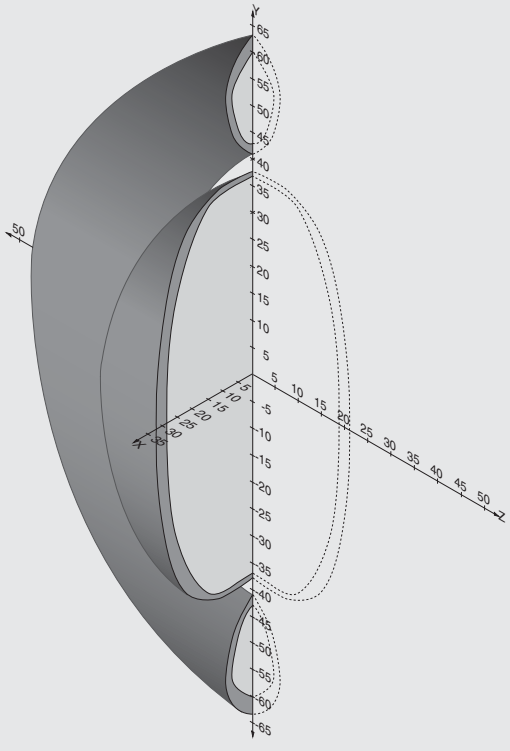
Pin	Designation	Description
1	NC	Not used *
2	START	Start input
3	LA	Safety output, channel 1
4	+ LA	Input for channel 1
5	+LB	Input for channel 2
6	LB	Safety output, channel 2
7	UB	Power supply, DC 24 V
8	0V	Ground, DC 0 V
9	NC	Not used *

* The unused connection pins are not allowed to be connected by the user.

Ordering table

Series	Category and PL acc. to EN ISO 13849-1	Version	Order no./item
CES-AH-C03-AH-... Unicode	3 / PL d	With M23 plug connector	**106300** CES-AH-C03-AH-SM-106300

Typical operating distances

Actuator	Safety switches CES-AH-C03-...
CES-A-BBA  page 117 **CES-A-BCA**  page 117	 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 118	 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-A-BRN  page 119	 For a side approach direction for the actuator and safety switch, a minimum distance of s = 12 mm must be maintained so that the operating distance of the side lobes is not entered.

Technical data for non-contact safety switches CES-AH-C03…

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic		
Dimensions		40 x 40 x 171		mm
Mass		0.35		kg
Ambient temperature at I(LA)/I(LB) > 3 A	-20	-	+55	°C
Ambient temperature at I(LA)/I(LB) < 3 A	-20	-	+70	
Storage temperature	-25	-	+70	
Degree of protection		IP67		
Safety class		III		
Degree of contamination		3		
Installation position		Any		
Connection		M23 plug connector, 9-pin		
Operating voltage U_B (reverse polarity protected, regulated, residual ripple < 5%)	20	-	28	V DC
Current consumption (no load on outputs)		150		mA
External fuse (operating voltage U_B, +LA and +LB)	0.25	-	10	A
Power supply for load U(+LA)/U(+LB)		U_B		V DC
Safety outputs (LA/LB, 2 semiconductor outputs, p-switching, short circuit proof, electrically decoupled)				
- Output voltage U(LA)/U(LB) [1]				
HIGH U(LA)/U(LB)	U_B - 1.5	-	U_B	
LOW U(LA)/U(LB)	0	-	4	
Switching current per safety output	30	-	4,000	mA
Utilization category according to EN 60947-5-2		DC-13 24V 4A Caution: outputs must be protected with a free-wheeling diode in case of inductive loads.		
Start input START				
HIGH	8	-	U_B	V DC
LOW	0	-	2	
Rated insulation voltage U_i	-	-	30	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Resilience to vibration		according to EN 60947-5-2		
Switching delay from state change [2]	-	-	260	ms
Fault detection time [3]	-	0.12	15	s
Difference time between the two safety outputs	-	-	50	ms
Ready delay [4]	-	-	3	s
Dwell time [5]	0.5	-	-	s
Switching frequency	-	-	1	Hz
Repeat accuracy R acc. to EN IEC 60947-5-3		≤ 10		%
Mounting distance between 2 switches or 2 actuators	80	-	-	mm
EMC protection requirements		according to EN 60947-5-3		
In combination with actuator CES-A-BBA				
Operating distance for center offset m = 0				
- Switch-on distance	-	20	-	mm
- Assured switch-on distance s_{ao}	18	-	-	
- Switching hysteresis	2	3	-	
- Assured switch-off distance s_{ar}	-	-	40	
In combination with actuator CES-A-BPA				
Operating distance for center offset m = 0				
- Switch-on distance	-	22	-	mm
- Assured switch-on distance s_{ao}	18	-	-	
- Switching hysteresis	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	-	mm
- Assured switch-on distance s_{ao}	20	-	-	
- Switching hysteresis	-	3	-	
- Assured switch-off distance s_{ar}	-	-	75	
Reliability values according to EN ISO 13849-1				
Category		3		
Performance Level (PL)		d		
PFH_d		1.01×10^{-7}/h		
Mission time		20		years

1) Values at a switching current of 4 A without taking into account the cable length.
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.
3) The fault detection time is the time for the detection of an internal fault in the device. At least one of the switching elements on each safety output is opened during this process.
4) After the operating voltage is switched on, the semiconductor outputs are switched off during the ready delay.
5) The dwell time of an actuator inside and outside the operating distance must be at least 0.5 s to ensure reliable detection of internal faults in the evaluation unit (self-monitoring).

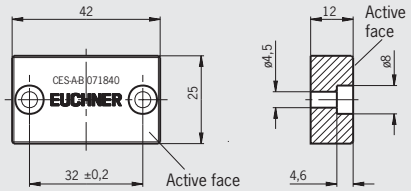
Actuator CES-A-BBA/CES-A-BCA

- **Cube-shaped design**
  42 x 25 mm

For possible combinations see page 113

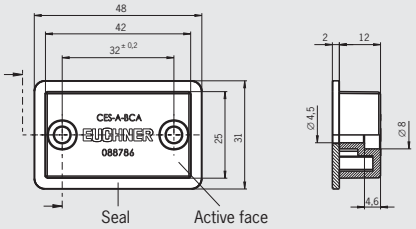
Actuator CES-A-BBA (Fortron)

Dimension drawing



2 safety screws
M4x14 included

Actuator CES-A-BCA (PE-HD)
Housing material PE-HD



2 safety screws
M4x14 included

Ordering table

Series	Comment	Version	Order no./item
CES-A-BBA	2 safety screws M4 x 14 included	-	**071840** CES-A-BBA
CES-A-BCA	2 safety screws M4 x 14 included Flat seal included	Housing material PE-HD [1]	**088786** CES-A-BCA

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

Technical data

Parameter	Value min.	Value typ.	Value 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)		Fluoro rubber 75 FPM 4100		
Dimensions		42 x 25 x 12		mm
Mass		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		

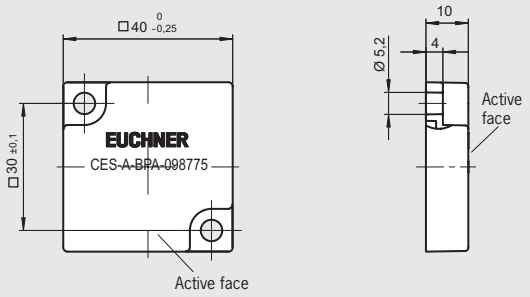
Actuator CES-A-BPA

- **Cube-shaped design 40 x 40 mm**

For possible combinations see page 113

Actuator CES-A-BPA

Dimension drawing



2 safety screws
M5x10 included

Ordering table

Series	Comment	Version	Order no./item
CES-A-BPA	2 safety screws M5 x 10 included	-	**098775** CES-A-BPA

Technical data

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

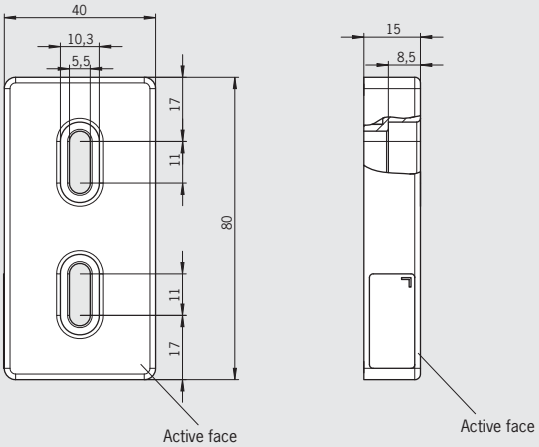
Actuator CES-A-BRN

- **Cube-shaped design**
  80 x 40 mm

For possible combinations see page 113

Actuator CES-A-BRN

Dimension drawing



2 safety screws
M5x16 included

Ordering table

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

Technical data

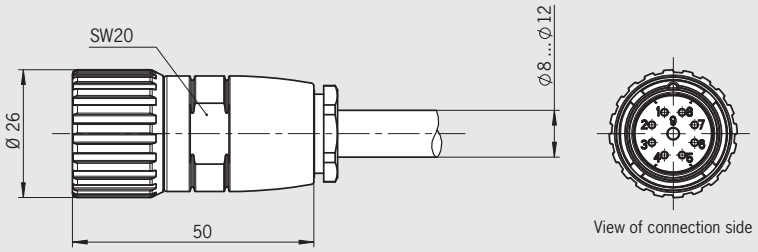
Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		PPS		
Dimensions		80 x 40 x 15		mm
Mass		0.06		kg
Ambient temperature	-25	-	+70	°C
Degree of protection acc. to EN IEC 60529		IP67		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

Plug connector

- **Plug connector for safety switch CES-AH-C03-...**

Plug connector M23
M23 plug, 9-pin

Dimension drawing



Ordering table

Designation	Version	Order no./item
M23 plug 9-pin	Mating connector for safety switches CES-AH-C03-... with soldered contacts	**106597** P-M23F09-106597

Technical data

Parameter	Value			Unit
	min.	typ.	max.	
Housing material		CuZn, nickel-plated		
Degree of protection acc. to EN 60529		IP67 (inserted)		

Safety screws

Ordering table

Fixing material/ screw size	Version/usage	Packaging unit [qty.]	Order no.
Safety screws **M4 x 14** (small head)	Actuator CES-A-BBA, CES-A-BCA,	20	**071863**
Safety screws **M5 x 16**	Actuator CES-A-BRN	100	**073456**
Safety screws **M5 x 10**	Actuator CES-A-BPA	100	**073455**

Non-contact safety switches CES-AP-...

Your advantages

- High protection against tampering
- Category 4 / PL e according to EN ISO 13849-1
- Integrated short circuit monitoring
- Large operating distance
- Connection via plug connectors
- Diagnostics using LED

The CES-AP makes transponder technology available to protect even very small guards and doors. The typical CES features such as large read distance and center offset are naturally also offered by the CES-AP. What is more, mounting on profile rails couldn't be easier.

Design and functionality
The safety switch CES-AP-... has two safety outputs. These outputs are connected directly to drives, downstream safety relays or safe control systems. The switch monitors itself for short circuits using pulsed signals. External clock signals are therefore not required.

Indication for actuator in the limit range
If the safety door with the actuator should settle over time, the actuator can drift out of the read head operating distance. The device recognizes this situation and indicates that the actuator is in the limit range. This allows the safety door to be readjusted in time.

Connection to safe control systems or safety relays
Do not use a control system or safety relay with pulsing for monitoring short circuits or switch off the pulsing function in these devices. The switch generates its own clock signals on the output lines (OA/OB or FO1A/FO1B). A downstream device must tolerate these test pulses.
The inputs on the downstream device must be suitable for positive-switching devices (pnp outputs), as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.

OUT/OD output (depending on version)
The semiconductor output OUT is OD is switched if the safety guard is closed (actuator in the operating distance). It is not allowed to be used for safety functions.

DIA output (depending on version)
The semiconductor output DIA is switched in the fault state. It is not allowed to be used for safety functions.

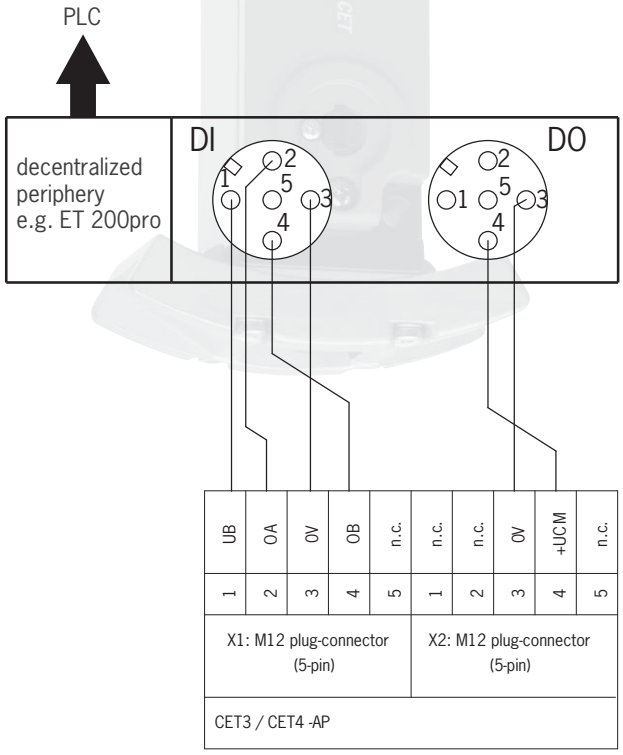
Reset input (depending on version)
The switch in a fault state can be reset via the RST input. To do this, a voltage of 24 V is applied to the RST input for at least 3 seconds. It is not necessary to disconnect the supply of power to reset a fault.

Non-contact safety switches CET-AP-... with guard locking and guard lock monitoring

Your advantages

- Safety switch with guard locking and safe guard lock monitoring
- Integrated CES-AP electronics
- Direct connection to decentralized peripheral systems (e.g. ET200pro)
- Safety category 4 and PL e according to EN ISO 13849-1 in case of horizontal mounting, or head downward
- Two safe semiconductor outputs and monitoring output OUT/OD
- Safety outputs with pulsing
- Input (optional) for the connection of feedback loop and start button

Design and functionality
In the CET-AP-... the advantages of the CES-AP-... are combined with the guard locking function of the CET-AX-... (see page 61). The CET-AP-... forms a complete safety solution (PL e according to EN ISO 13849-1).



For detailed information on connection, please refer to the system documentation at www.EUCHNER.de.

Typical system times CES-AP

Ready delay
After switching on, the unit carries out a self-test for 8 s (500 ms for CES-AP-C01). The system is ready for operation only after this time.

Switch-on time of safety outputs
The max. reaction time from the moment when the actuator is at the operating distance (safety door closed) to the moment when the safety outputs switch on Ton is 400 ms.

Risk time according to EN 60947-5-3
If an actuator moves outside the operating distance, the safety outputs OA and OB are deactivated after a maximum of 260 ms.

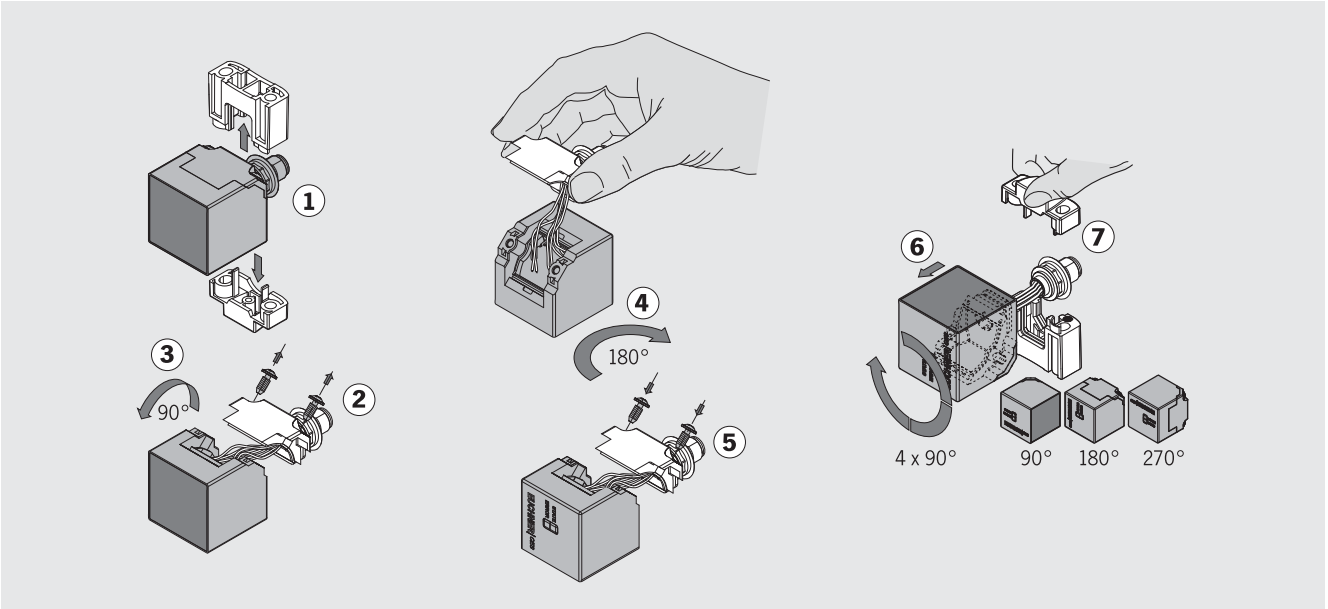
Difference time
The safety outputs (OA/OB or FO1A/FO1B) switch at slightly different times. They have the same signal state at the latest after a difference time of 10 ms.

Fault detection time
Faults are detected after max. 300 ms.

LED indicators

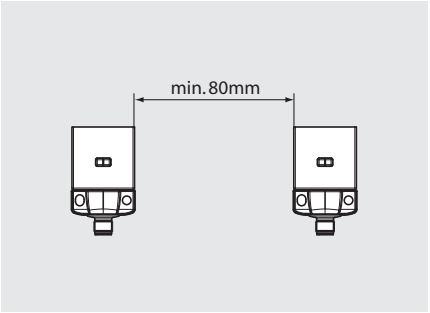
LED	Color	State	Significance
STATE	green	illuminated	Normal operation
		flashing	- Door open - Teach-in operation or Power Up - Actuator in limit range (refer to the status table for further signal functions)
DIA	red	illuminated	- Internal electronics fault - Fault at the inputs/outputs

Changing the approach direction for CES-AP-C01

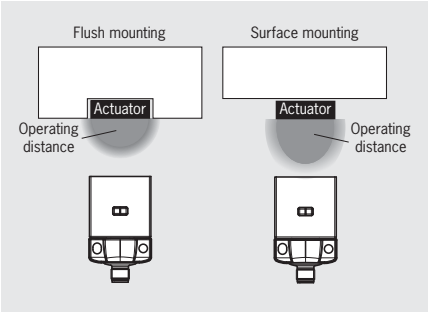


Mounting CES-AP-C01

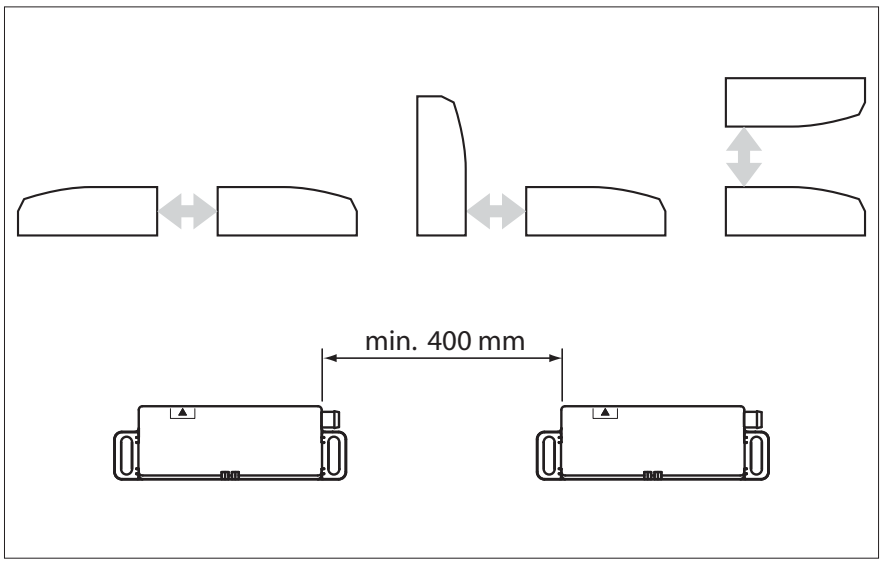
When mounting several safety switches, observe the stipulated minimum distance to avoid mutual interference.



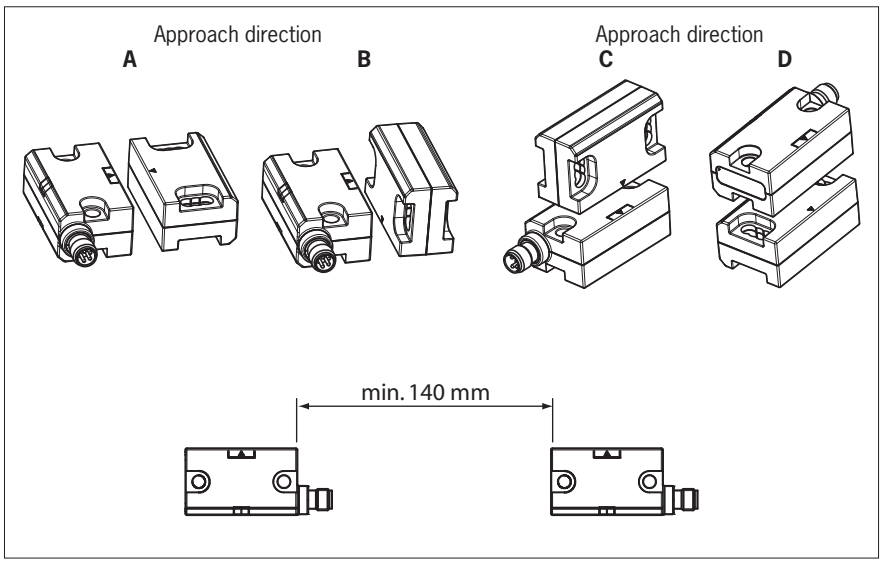
distance changes as a function of the installation depth and the safety guard material.



Approach directions and minimum distance CES-AP-C.2



Approach directions and minimum distance CES-I-AP-.-C04



Safety switches

C01
Cat. 4 PLe

CES-AP-C01-.H-...
- One active face
- Approach direction adjustable
- Pulsing for short circuit detection
- Available in the unicode and multicode variants

(see page 130)

C02
Cat. 4 PLe

CES-AP-C.2-.H-...
- Two active faces
- Door hinged on right or left
- Pulsing for short circuit detection
- Available in the unicode and multicode variants

(see page 136)

C04
Cat. 4 PLe

CES-I-AP-.-C04-...
- Three active faces
- Pulsing for short circuit detection
- Available in the unicode and multicode variants

(see page 142)

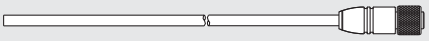
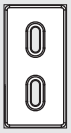
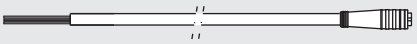
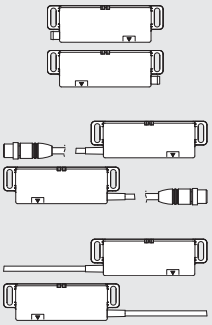
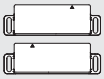
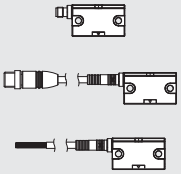
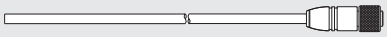
Cat. 4 PLe

CET.-AP-...-AH-...
- Guard locking with guard lock monitoring
- Pulsing for short circuit detection
- Available in the unicode and multicode variants

(see page 148)

Actuator	
	**CES-A-BBA** ▸ Cube-shaped (see page 133)
	**CES-A-BCA** ▸ Cube-shaped (see page 133)
	**CES-A-BPA** ▸ Square (see page 134)
	**CES-A-BRN** ▸ Cube-shaped (see page 135)
	**CES-A-BLN-.2** ▸ Cube-shaped (see page 140)
	**CES-A-BLN-U2** ▸ Cube-shaped, compact (see page 140)
	**CES-A-BDN** ▸ Cube-shaped design ∅ 6 mm (see page 141)
	**CES-A-BBN-C04-115271** ▸ Cube-shaped, compact (see page 146)
	**CET-A-BWK-50X** ▸ Locking force 6,500 N (see page 149)

Component overview for non-contact safety switches CES-AP

Connection cable	Safety switches	Actuator	Bolt
 page 155	CES-AP-C01…  page 130	CES-A-BBA  page 133 CES-A-BCA  page 133 CES-A-BPA  page 134 CES-A-BRN  page 135	page 229 - 233
 page 155	CES-AP-C.2…  page 136	CES-A-BLN-.2  page 140 CES-A-BLN-U2  page 140 CES-A-BDN  page 141	-
 page 155	CES-I-AP-.-C04…  page 142	CES-A-BBN-C04-115271  page 146	-
Connection cable CET-AP  page 155	CET.-AP-…  page 148	CET-A-BWK-50X  page 149	page 235

Possible combinations for CES components

To give you a quick overview of which CES components can be combined with each other, there is a combination 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-AP

Safety switch	Actuator									
	CES-A-BLN-R2-100776 100776	**CES-A-BLN-L2-104510** 104510	**CES-A-BLN-U2-103450** 103450	**CES-A-BDN-O6-104730** 104730	**CES-A-BBA** 071840	**CES-A-BCA** 088786	**CES-A-BPA** 098775	**CES-A-BRN** 100251	**CES-A-BBN-C04-115271** 115271	**CET-A-BWK-50X** 096327
CES-AP-C01-...					18	18	22	27		
CES-AP-CR2-...	15		15	19						
CES-AP-CL2-...		15	15	19						
CES-I-AP-.-C04-...				19					15	
CET.-AP...										

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

1) c UL us LISTED

- **Read head with integrated evaluation electronics**
- **No series connection**
- **Short circuit monitoring**
- **2 safety outputs (semiconductor outputs)**
- **Category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 129

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.

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

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

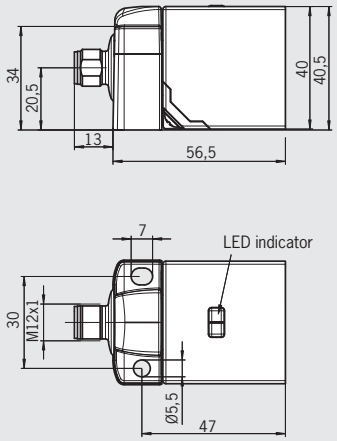
Important: To achieve the stated category in accordance with EN ISO 13849-1, both safety outputs (OA and OB) must be evaluated.

LED indicator
STATE Status LED
DIA Diagnostics LED

Additional connections
DIA Diagnostics output (semiconductor)
RST Reset input

Non-contact safety switches CES-AP-C01-... Cat. 4 / PLe
M12 plug

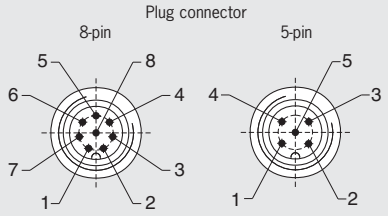
Dimension drawing



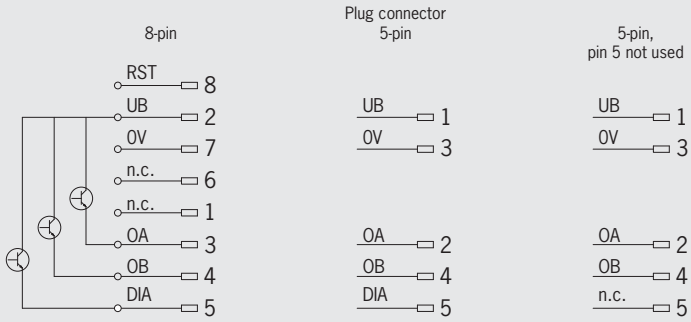
For connection cable see page 155

Terminal assignment

Plug connector pin 8-pin	Plug connector pin 5-pin	Plug connector pin 5-pin, pin 5 not used	Designation	Description
1	-	-	n.c.	Not used
2	1	1	UB	Power supply, DC 24 V
3	2	2	OA	Safety output, channel 1
4	4	4	OB	Safety output, channel 2
5	5	-	DIA	Monitoring output
6	-	-	n.c.	Not used
7	3	3	0V	Ground, DC 0 V
8	-	-	RST	Reset input for hardware reset



View on the connection side of the safety switch



Ordering table

Series	Category and PL acc. to EN ISO 13849-1	Version	Order no.
CES-AP-C01-CH-SB Multicode	4 / PL e	M12 plug connector 5-pin	**106798** CES-AP-C01-CH-SB-106798
CES-AP-C01-CH-SB Multicode	4 / PL e	M12 plug connector 5-pin, pin 5 not used	**111708** CES-AP-C01-CH-SB-111708
CES-AP-C01-AH-SB Unicode	4 / PL e	M12 plug connector 5-pin, pin 5 not used	**111145** CES-AP-C01-AH-SB-111145
CES-AP-C01-CH-SA Multicode	4 / PL e	M12 plug connector 8-pin	**100250** 1) CES-AP-C01-CH-SA-100250

1) German Social Accident Insurance approval

Typical operating distances

Safety switch

CES-AP-C01-...

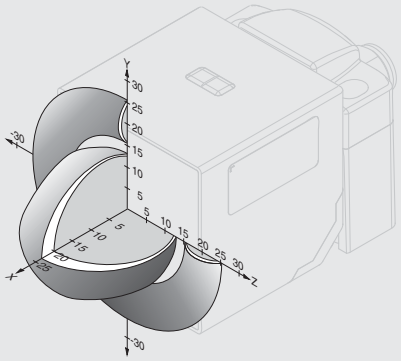
Actuator

CES-A-BBA

page 133

CES-A-BCA

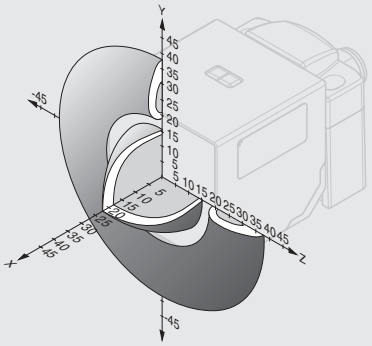
page 133



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

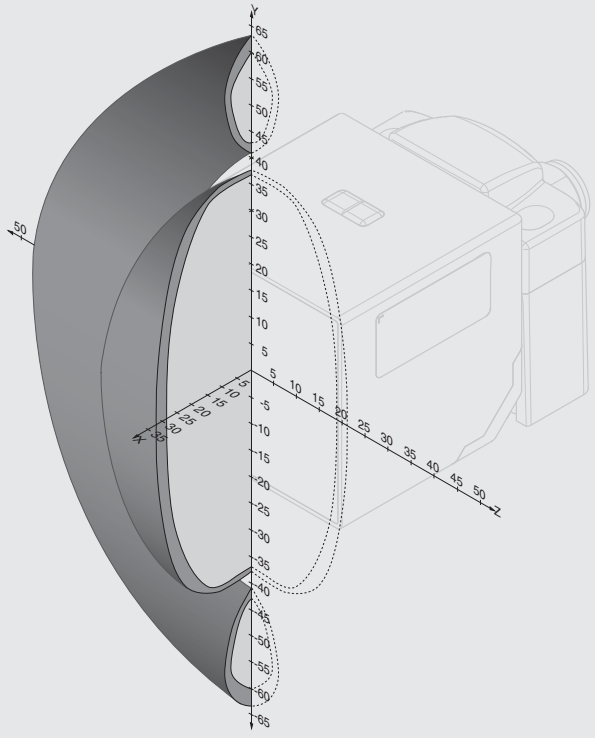
page 134



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-A-BRN

page 135



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.

Technical data for non-contact safety switches CES-AP-C01-...

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	PBT V0 GF30			
Dimensions	according to EN 60947-5-2			mm
Mass	0.4			kg
Ambient temperature at U_B = DC 24 V	-20	-	+55	°C
Storage temperature	-25	-	+70	
Degree of protection	IP67			
Safety class	III			
Degree of contamination	3			
Installation position	Any			
Connection	M12 plug connector, 5 and 8-pin			
Operating voltage U_B (reverse-polarity protected, regulated, residual ripple < 5%)	24 ± 15% (PELV)			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	-	8	A
EMC protection requirements	according to EN 60947-5-3 and EN IEC 61326-3-1			
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 24V 400mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads			
Off-state current I_r according to EN IEC 60947-5-2 (OA/OV) [2]	≤ 0.25			mA
Rated insulation voltage U_i	-	-	300 [3]	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 (DIA) [1] (Semiconductor output, p-switching, short circuit-proof)				
Output voltage	0.8 x 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	-	mm
- Assured switch-on distance s_{ao} [4]	15	-	-	
- Switching hysteresis [2]	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 [5]	-	mm
- Assured switch-on distance s_{ao}	18	-	-	
- Switching hysteresis [4]	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 [6]	-	mm
- Assured switch-on distance s_{ao}	20	-	-	
- Switching hysteresis [6]	-	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 x 10^{-9} / h			
Mission time	20			years

1) Values at a switching current of 50 mA without taking into account the cable length.
2) Maximum current at an output in switched-off state.
3) Tested by employers' liability insurance association up to 75 V
4) Values apply to surface installation of the actuator.
5) On surface mounting on aluminum; in a non-metallic environment the typical switching distance increases to 30 mm.
6) In case of surface mounting on steel.

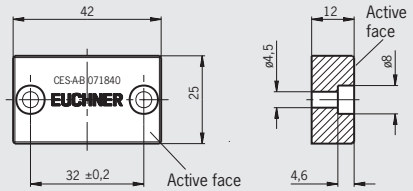
Actuator CES-A-BBA / CES-A-BCA

- **Cube-shaped design**
  42 x 25 mm

For possible combinations see page 129

Actuator CES-A-BBA

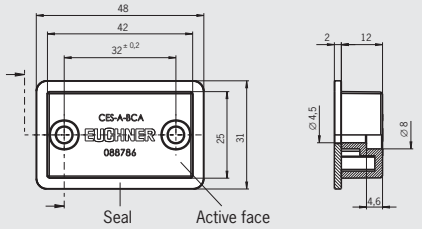
Dimension drawing



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 included	-	**071840** CES-A-BBA
CES-A-BCA	2 safety screws M4 x 14 included Flat seal included	Housing material PE-HD [1]	**088786** CES-A-BCA

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

Technical data

Parameter	Value min.	Value typ.	Value 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)	Fluoro rubber 75 FPM 4100			
Dimensions	42 x 25 x 12			mm
Mass	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			

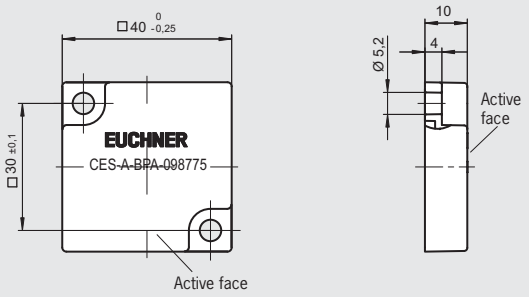
Actuator CES-A-BPA

- **Cube-shaped design**
  40 x 40 mm

For possible combinations see page 129

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 included	-	**098775** CES-A-BPA

Technical data

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

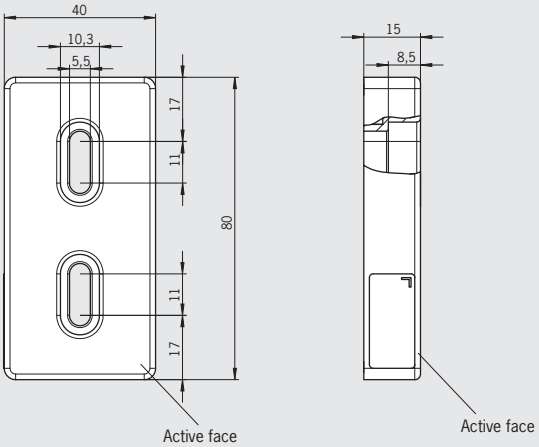
Actuator CES-A-BRN

- **Elongated operating distance in the y direction**
- **Cube-shaped design 80 x 40 mm**

For possible combinations see page 129

Actuator CES-A-BRN

Dimension drawing



2 safety screws
M5x16 included

Ordering table

Series	Comment	Version / actuator number	Order no.
CES-A-BRN	2 safety screws M5 x 16 included	-	**100251** CES-A-BRN-100251

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		PPS		
Dimensions		80 x 40 x 15		mm
Mass		0.06		kg
Ambient temperature	-25	-	+70	°C
Degree of protection acc. to EN IEC 60529		IP 67		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

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

- **Read head with integrated evaluation electronics**
- **No series connection**
- **Short circuit monitoring**
- **2 safety outputs (semiconductor outputs)**
- **Category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 129

For ordering table see page 139.

Approach direction
For approach directions see illustration "Approach directions and minimum distance" on page 125.

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.

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

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.

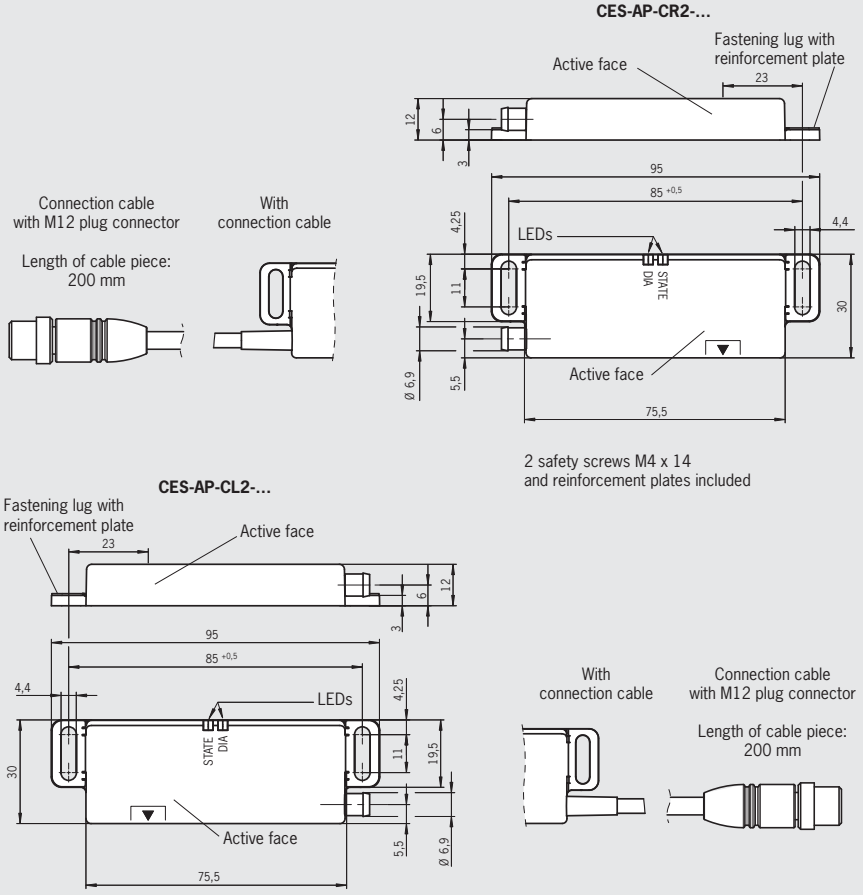
LED indicator
STATE Status LED
DIA Diagnostics LED

Additional connections
OUT Monitoring output (semiconductor)

1) Partial UL approval (see ordering table page 139)

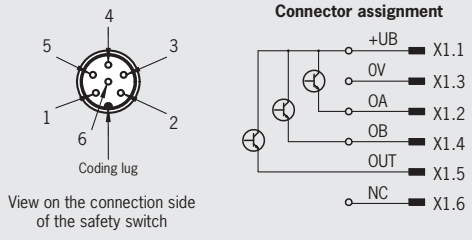
Non-contact safety switches CES-AP-C.2-... Cat. 4 / PLe

Dimension drawing



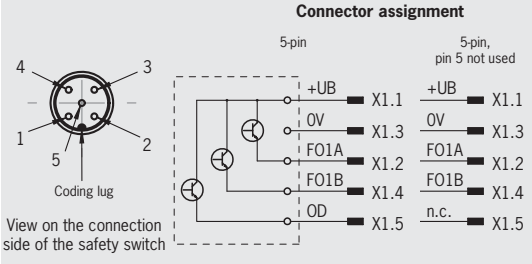
Terminal assignment

Plug connector with latching connection, 6-pin, or flying lead



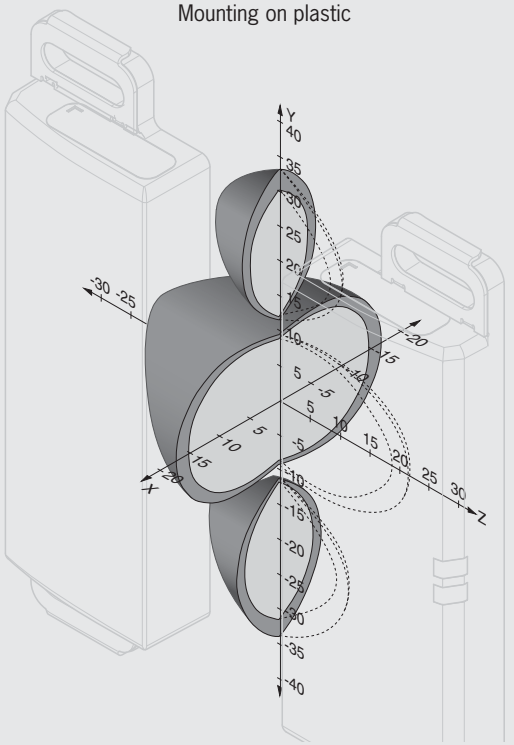
Pin	Designation/description		Wire color
1	UB	Power supply DC 24 V	BN
2	OA	Safety output channel 1	WH
3	0V	Ground DC 0 V	BU
4	OB	Safety output channel 2	BK
5	OUT	Monitoring output	GY
6	-	Not used	PK

Connection cable with M12 plug connector, 5-pin



Pin	Designation/description		Wire color
1	UB	Power supply DC 24 V	BN
2	OA	Safety output channel 1	WH
3	0V	Ground DC 0 V	BU
4	OB	Safety output channel 2	BK
5	OUT/ n.c.	Monitoring output	GY

Typical operating distances

Actuator	Safety switch CES-AP-C.2-...
CES-A-BLN... page 140 page 140	Mounting on plastic  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-A-BDN-06 page 141	Operating distance as for actuator CES-A-BLN... (see above)

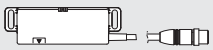
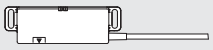
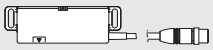
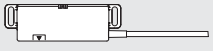
Attention:
The operating distance may vary depending on the substrate material and installation situation.

Technical data for non-contact safety switches CES-AP-C.2-...

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic PBT		
Dimensions		95 x 30 x 12		mm
Mass		0.04		kg
Ambient temperature at U_B = DC 24 V				°C
- Plug connector with latching connection	-30	-	+65	
- With connection cable with M12 plug connector				
- Connection cable laid rigidly	-40	-	+65	
- Connection cable movable	0	-	+65	
Storage temperature	-40	-	+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%) 1)		24 ± 15% (PELV)		V DC
For the approval according to cULus the following applies		Operation only with UL class 2 power supply, or equivalent measures		
Current consumption		30		mA
Switching load according to cULus		DC 24 V, class 2		
External fuse (operating voltage)	0.25	-	1.5	A
Safety outputs OA/OB		Semiconductor outputs, p-switching, short circuit-proof		
- Output voltage U(OA)/U(OB) 2)				
HIGH U(OA)	U_B-1.5	-	U_B	V DC
HIGH U(OB)				
LOW U(OA)/U(OB)	0		1	
Switching current per safety output	1	-	150	mA
Utilization category according to EN 60947-5-2		DC-13 24 V 150 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads.		
Off-state current I_r		≤ 0.25		mA
Monitoring output OUT 2)		Semiconductor output p-switching, short circuit-proof		
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	50	mA
Rated insulation voltage U_i	-	-	75	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Resilience to vibration		acc. to EN IEC 60947-5-2		
Switching frequency	-	-	1	Hz
Repeat accuracy R		≤ 10		%
EMC protection requirements		according to EN 60947-5-3		
In combination with actuator CES-A-BLN... 3)				
Operating distance for center offset m = 0				
- Switch-on distance	-	15	-	mm
- 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-BDN... 3)				
Operating distance for center offset m = 0				
- Switch-on distance	-	19	-	mm
- 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		1.8 x 10^{-9} / h		
Mission time		20		years

1) The device tolerates voltage interruptions of up to 5 ms.
2) Values at a switching current of 50 mA without taking into account the cable lengths.
3) The operating distance may vary depending on the substrate material and installation situation.

Ordering table

Series		Version	Order no./ item
Safety switches **CES-AP-C.2-AH-...** Unicode		Door hinge right, plug connector with latching connection, 6-pin	**105295** [1] CES-AP-CR2-AH-SF-105295
		Door hinge left, plug connector with latching connection, 6-pin	**105294** [1] CES-AP-CL2-AH-SF-105294
		Door hinge right, connection cable PUR, length 0.2 m, with plug connector M12, 5-pin	**106552** CES-AP-CR2-AH-SB-106552
		Door hinge left, connection cable PUR, length 0.2 m, with plug connector M12, 5-pin	**106553** CES-AP-CL2-AH-SB-106553
		Door hinge right, connection cable PUR, length 0.2 m, with connection cable M12, 5-pin, pin 5 not used	**111748** CES-AP-CR2-AH-SB-111748
		Door hinge left, connection cable PUR, length 0.2 m, with connection cable M12, 5-pin, pin 5 not used	**111747** CES-AP-CL2-AH-SB-111747
		Door hinge right, connection cable PVC, 6-core, length 5 m, flying lead	**105601** CES-AP-CR2-AH-L05-105601
		Door hinge left, connection cable PVC, 6-core, length 5 m, flying lead	**105603** CES-AP-CL2-AH-L05-105603
		Door hinge right, connection cable PVC, 6-core, length 10 m, flying lead	**106191** CES-AP-CR2-AH-L10-106191
		Door hinge left, connection cable PVC, 6-core, length 10 m, flying lead	**106192** CES-AP-CL2-AH-L10-106192
		Door hinge right, connection cable PVC, 6-core, length 20 m, flying lead	**106195** CES-AP-CR2-AH-L20-106195
		Door hinge left, connection cable PVC, 6-core, length 20 m, flying lead	**106196** CES-AP-CL2-AH-L20-106196
Safety switches **CES-AP-C.2-CH-...** Multicode		Door hinge right, plug connector with latching connection, 6-pin	**100775** [1] CES-AP-CR2-CH-SF-100775
		Door hinge left, plug connector with latching connection, 6-pin	**104509** [1] CES-AP-CL2-CH-SF-104509
		Door hinge right, connection cable PUR, length 0.2 m, with plug connector M12, 5-pin	**106550** CES-AP-CR2-CH-SB-106550
		Door hinge left, connection cable PUR, length 0.2 m, with plug connector M12, 5-pin	**106551** CES-AP-CL2-CH-SB-106551
		Door hinge right, connection cable PUR, length 0.2 m, with connection cable M12, 5-pin, pin 5 not used	**109168** CES-AP-CR2-CH-SB-109168
		Door hinge left, connection cable PUR, length 0.2 m, with connection cable M12, 5-pin, pin 5 not used	**109167** CES-AP-CL2-CH-SB-109167
		Door hinge right, connection cable PVC, 6-core, length 5 m, flying lead	**105600** CES-AP-CR2-CH-L05-105600
		Door hinge left, connection cable PVC, 6-core, length 5 m, flying lead	**105602** CES-AP-CL2-CH-L05-105602
		Door hinge right, connection cable PVC, 6-core, length 10 m, flying lead	**106189** CES-AP-CR2-CH-L10-106189
		Door hinge left, connection cable PVC, 6-core, length 10 m, flying lead	**106190** CES-AP-CL2-CH-L10-106190
		Door hinge right, connection cable PVC, 6-core, length 20 m, flying lead	**106193** CES-AP-CR2-CH-L20-106193
		Door hinge left, connection cable PVC, 6-core, length 20 m, flying lead	**106194** CES-AP-CL2-CH-L20-106194

1) UL approval

Actuator CES-A-BLN...

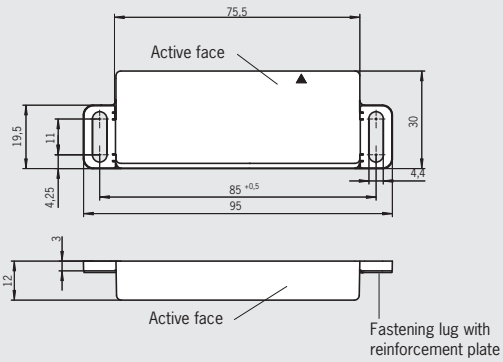
- **Cube-shaped design 55 x 30 mm and 95 x 30 mm**

For possible combinations see page 129

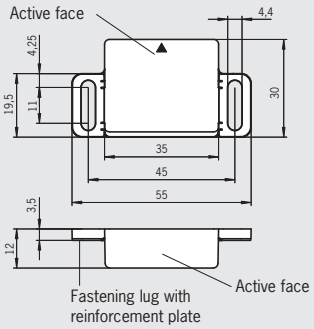
Actuator CES-A-BLN...

Dimension drawing

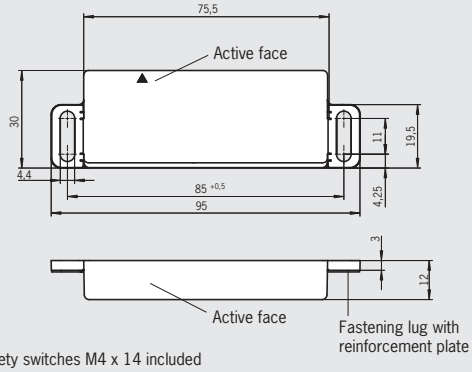
CES-A-BLN-R2



CES-A-BLN-U2



CES-A-BLN-L2



2 safety switches M4 x 14 included

Ordering table

Series	Comment	Version	Order no. Item
Actuator CES-A-BLN...	2 safety switches 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	Value min.	Value typ.	Value 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
Mass - 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 acc. to EN 60529		IP67 / IP69K		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

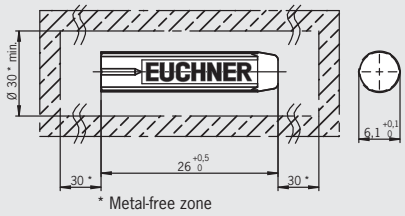
Actuator CES-A-BDN-06

- **Cylindrical design ∅ 6 mm**

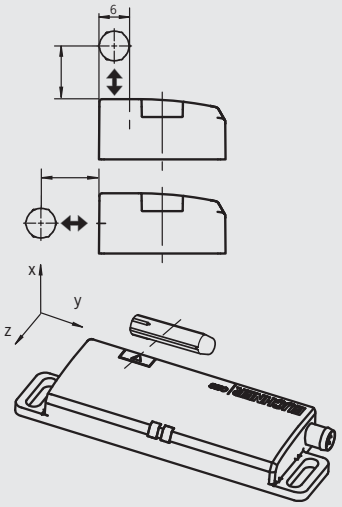
For possible combinations see page 129

Actuator CES-A-BDN-06

Dimension drawing



Installation options



Ordering table

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

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Macromelt PA-based plastic		
Dimensions		26 x ∅ 6		mm
Mass		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

Non-contact safety switches CES-I-AP-.-C04-...

- **Read head with integrated evaluation electronics**
- **No series connection**
- **Short circuit monitoring**
- **2 safety outputs (semiconductor outputs)**
- **Category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 129

For ordering table see page 145.

Approach direction
For approach directions see illustration "Approach directions and minimum distance" on page 125.

Short circuit monitoring
The switch generates its own clock signal on the output lines FO1A/FO1B.
Pay attention to this aspect when connecting to control systems and relays.

Available coding options, (see page 5)
- Unicode evaluation
- Multicode evaluation

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

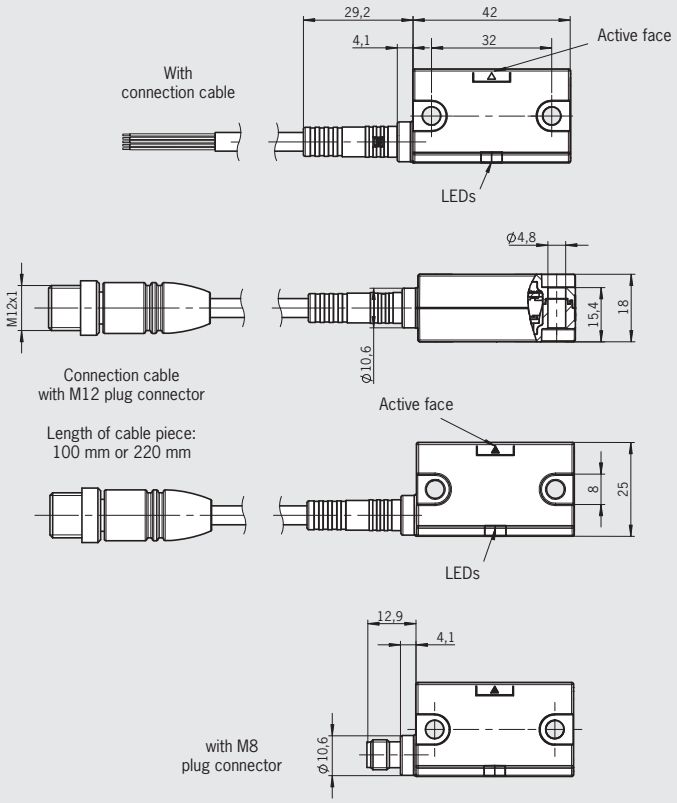
Important: To achieve the stated category in accordance with EN ISO 13849-1, both safety outputs (FO1A and FO1B) must be evaluated.

LED indicator
STATE Status LED
DIA Diagnostics LED

Additional connections
OD Monitoring output (semiconductor), not present on all versions

Non-contact safety switches CES-I-AP-.-C04-... Cat. 4 / PLe

Dimension drawing

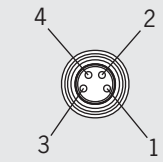


Rubber support included

For connection cable see page 155

Terminal assignment

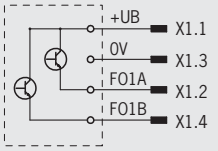
M8 plug connector, 4-pin, or flying lead



View on the connection side of the safety switch

Connector assignment

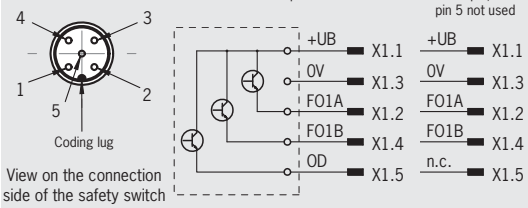
CES-I-AP-...-.SK-...



Pin	Designation/description		Wire color
1	UB	Power supply DC 24 V	BN
2	FO1A	Safety output channel 1	WH
3	0V	Ground DC 0 V	BU
4	FO1B	Safety output channel 2	BK

Connection cable with M12 plug connector, 5-pin

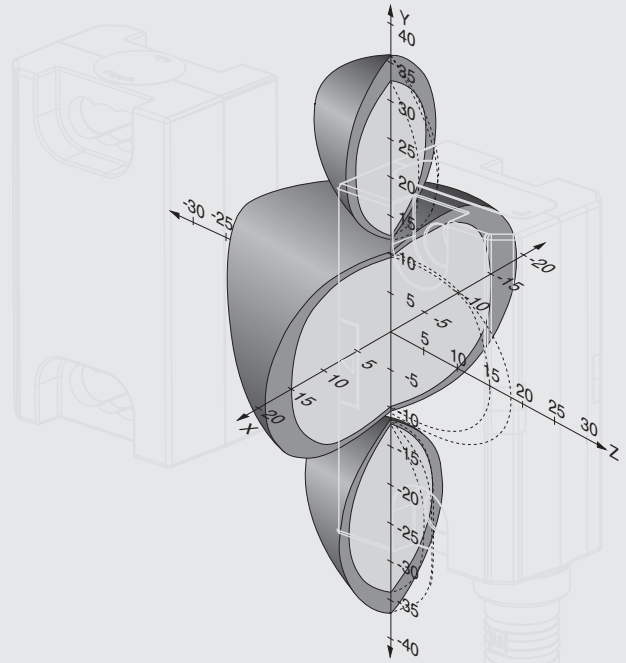
Connector assignment



View on the connection side of the safety switch

Pin	Designation/description		Wire color
1	UB	Power supply DC 24 V	BN
2	FO1A	Safety output channel 1	WH
3	0V	Ground DC 0 V	BU
4	FO1B	Safety output channel 2	BK
5	OD/ n.c.	Monitoring output	GY

Typical operating distances

	Safety switch CES-I-AP-.-C04-...
Actuator **CES-A-BBN-C04-115271** page 146	 For a side approach direction (y 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-A-BDN-06 page 147	Operating distance as for actuator CES-A-BBN-C04... (see above)

Attention:
The operating distance may vary depending on the substrate material and installation situation.

Technical data for non-contact safety switches CES-I-AP-.-C04-...

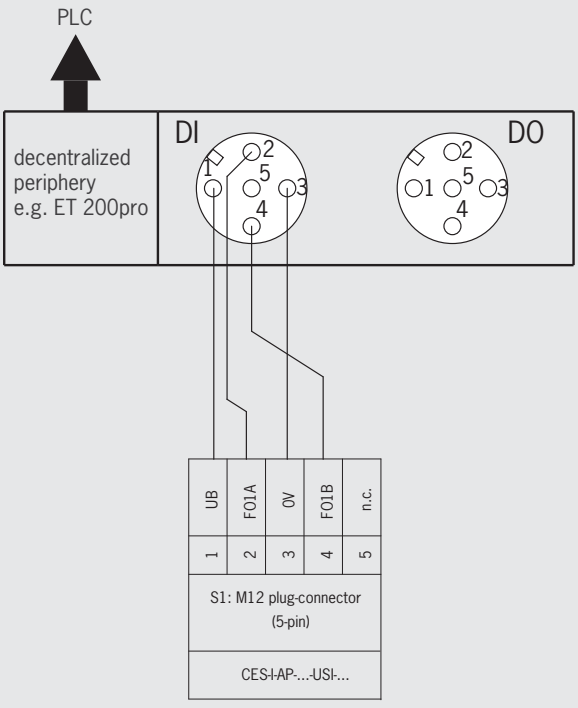
Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic PBT		
Dimensions		42 x 25 x 18		mm
Mass		0.05		kg
Ambient temperature at U_B = DC 24 V				°C
- With connection cable with M12 plug connector				
- Connection cable laid rigidly	-25	-	+65	
- Connection cable movable	-5	-	+65	
Storage temperature	-40	-	+70	
Degree of protection		IP67		
Safety class		III		
Degree of contamination		3		
Installation position		non-flush		
Connection		Plug connector or connection cable		
Operating voltage U_B (reverse polarity protected, regulated, residual ripple < 5%) [1]		24 ± 15% (PELV)		V DC
Current consumption		35		mA
Switching load according to cULus		DC 24 V, class 2		
External fuse (operating voltage)	0.25	-	1.5	A
Safety outputs FO1A/FO1B		Semiconductor outputs, p-switching, short circuit-proof		
- Output voltage U(FO1A)/U(FO1B) [2]				V DC
HIGH U(FO1A)	U_B-1.5	-	U_B	
HIGH U(FO1B)	U_B-1.5	-	U_B	
LOW U(FO1A)/U(FO1B)	0		1	
Switching current per safety output	1	-	150	mA
Utilization category according to EN 60947-5-2		DC-13 24 V 150 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads.		
Off-state current I_r		≤ 0.25		mA
Monitoring output OD [2]		Semiconductor output p-switching, short circuit-proof		
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	50	mA
Rated insulation voltage U_i	-	-	300	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Resilience to vibration		acc. to EN IEC 60947-5-2		
Switching frequency	-	-	1	Hz
Repeat accuracy R		≤ 10		%
EMC protection requirements		according to EN 60947-5-3		
In combination with actuator CES-A-BBN-C04-115271...		**Approach directions A and B (see page 125)**		
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-BBN-C04-115271...		**Approach directions C and D (see page 125)**		
Operating distance for center offset m = 0				mm
- Switch-on distance	-	11	-	
- Assured switch-on distance s_{ao}	6	-	-	
- Switching hysteresis [2]	1	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		4.1×10^{-9} / h		
Mission time		20		years

1) The device tolerates voltage interruptions of up to 5 ms.
2) Values at a switching current of 50 mA without taking into account the cable lengths.

Ordering table

Series	Version		Order no./ item
Safety switches **CES-I-AP-U-C04-...** Unicode		Plug connector M8, 4-pin	**115324** CES-I-AP-U-C04-SK-115324
		Connection cable PUR, length 0.1 m, with connection cable M12, 5-pin, pin 5 not used	**115150** CES-I-AP-U-C04-USI-115150
		With monitoring output OD, connection cable PUR, length 0.22 m, with plug connector M12, 5-pin	**116502** CES-I-AP-U-C04-USB-116502
		With monitoring output OD, connection cable PUR, length 5 m, flying lead	**116503** CES-I-AP-U-C04-U05-116503
		With monitoring output OD, connection cable PUR, length 10 m, flying lead	**116504** CES-I-AP-U-C04-U10-116504
		With monitoring output OD, connection cable PUR, length 20 m, flying lead	**116505** CES-I-AP-U-C04-U20-116505
Safety switches **CES-I-AP-M-C04-...** Multicode		Plug connector M8, 4-pin	**117325** CES-I-AP-M-C04-SK-117325
		Connection cable PUR, length 0.1 m, with connection cable M12, 5-pin, pin 5 not used	**117323** CES-I-AP-M-C04-USI-117323
		With monitoring output OD, connection cable PUR, length 0.22 m, with plug connector M12, 5-pin	**117324** CES-I-AP-M-C04-USB-117324
		With monitoring output OD, connection cable PUR, length 5 m, flying lead	**117328** CES-I-AP-M-C04-U05-117328
		With monitoring output OD, connection cable PUR, length 10 m, flying lead	**117329** CES-I-AP-M-C04-U10-117329
		With monitoring output OD, connection cable PUR, length 20 m, flying lead	**117330** CES-I-AP-M-C04-U20-117330

Direct connection to decentralized peripheral systems (e.g. ET200pro)



Connection example for connection to decentralized peripheral equipment

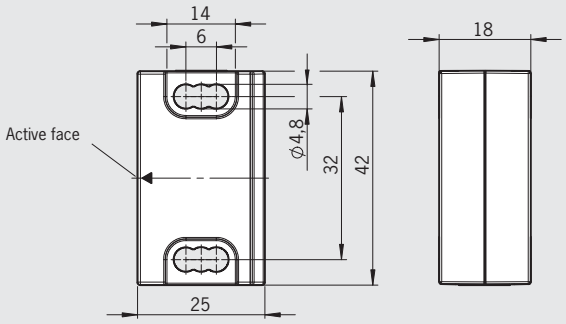
Actuator CES-A-BBN-C04-...

- **Cube-shaped design 42 x 25 mm**

For possible combinations see page 129

Actuator CES-A-BBN-C04-...

Dimension drawing



2 safety screws M4x20
with rubber supports
included

Ordering table

Series	Comment	Version	Order no. Item
Actuator CES-A-BBN...	2 safety switches M4 X 20 included		**115271** CES-A-BBN-C04-115271

Technical data

Parameter	Value min.	 typ.	 max.	Unit
Housing material		Plastic PBT		
Dimensions		42 x 25 x 18		mm
Mass		0.03		kg
Ambient temperature	-40	-	+65	°C
Degree of protection acc. to EN 60529		IP67		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

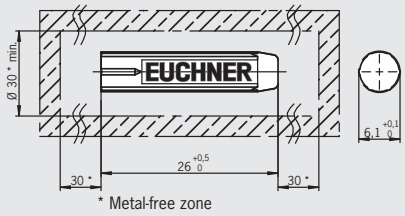
Actuator CES-A-BDN-06

- **Cylindrical design ∅ 6 mm**

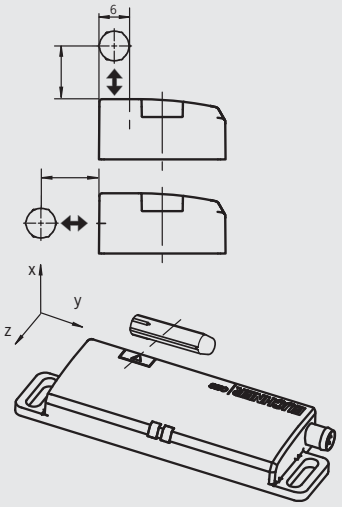
For possible combinations see page 129

Actuator CES-A-BDN-06

Dimension drawing



Installation options



Ordering table

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

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Macromelt PA-based plastic		
Dimensions		26 x ∅ 6		mm
Mass		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

Non-contact safety switches CET-AP-... with guard locking and guard lock monitoring

- **Safety switch with guard locking and integrated evaluation electronics**
- **Locking force up to 6,500 N**
- **No series connection**
- **Short circuit monitoring**
- **2 safety outputs (semiconductor outputs)**
- **Up to category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 129

For ordering table see page 152 ff.

Approach direction

Horizontal
Can be adjusted in 90° steps

Safety switches
The safety switch CET is only allowed to be operated in conjunction with the actuator CET-A-BWK-50X.
Important: The actuator must be ordered separately (see page 169).

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

Mechanical release
Is used for releasing the guard locking with the aid of a tool. The mechanical release must be sealed to prevent tampering (for example with sealing lacquer).

Escape release (optional)
Is used for the manual release of the guard locking from within the danger area without tools.

Wire front release (optional)
The wire front release permits remote release of the guard locking via a pull rope. Flexible routing of the pull wire permits release of the guard locking in inaccessible installation situations.
The handle for the wire front release is not included. Please order separately (see page 135).

Lockout mechanism
The lockout mechanism can be used to prevent maintenance personnel from being unintentionally locked in the danger area, for example. In locked position, the lockout mechanism prevents activation of guard locking. The lockout mechanism can be secured in locking position with up to three locks. The mechanical release can still be used.

Solenoid operating voltage
- DC 24 V +10%, -15%

Guard locking types
- **CET3** Function as for CET1-AP, but here the door position is also monitored. The door monitoring output OUT D is set to HIGH as soon as the actuator protrudes beyond the extended lift tappet (state: door closed, guard locking not active). The output OUT D remains set also with guard locking active.
- **CET4** Function as for CET2-AP, but here the door position is also monitored. The door monitoring output OUT D is set to HIGH as soon as the actuator protrudes beyond the extended lift tappet (state: door closed, guard locking not active). The output OUT D remains set also with guard locking active.

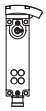
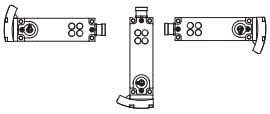
LED function display
- **LED State** Status LED
- **LED DIA** Diagnostics LED
- **LED 1 red** Solenoid
- **LED 2 green** OUT D

Additional connections
OUT Monitoring output (semiconductor)
OUT D Door monitoring output
RST Reset input

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.

The category is dependent on the installation position of the safety switch:

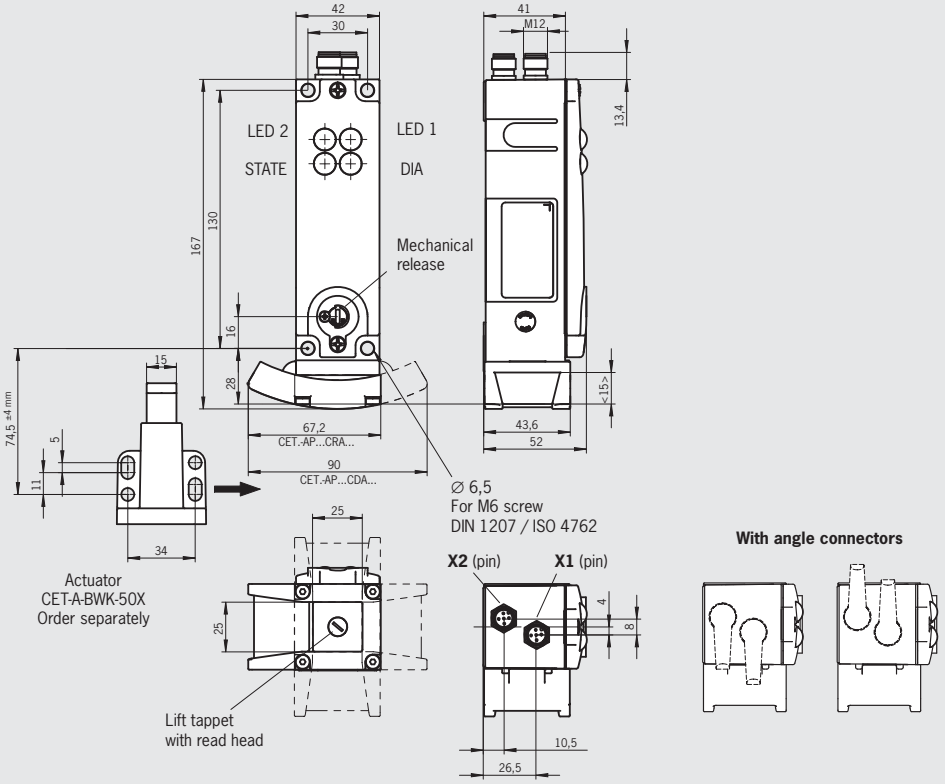
Installation position	Achievable category and PL according to EN ISO 13849-1
Head upward 	3 / PL e
Head downward or horizontal 	4 / PL e

1) 2)

Non-contact safety switches CET-AP...
with 2 plug connectors M12

Cat. 4 PLe

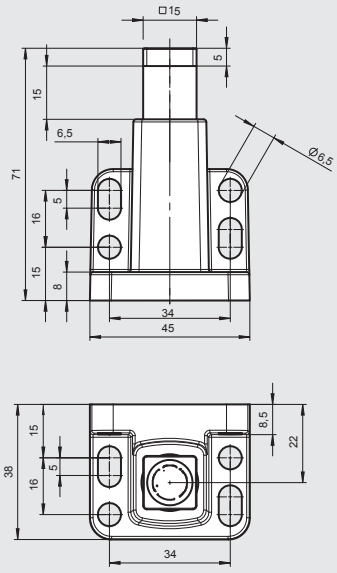
Dimension drawing



For connection cable see page 155

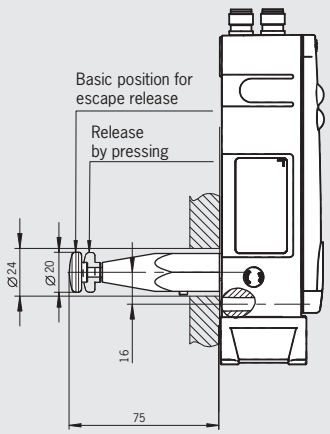
Actuator CET-A-BWK-50X
for safety switch CET-AP

Dimension drawing

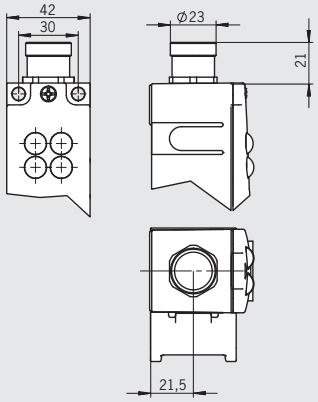


4 safety screws
M5x16 included

Safety switch CET-AP...
with escape release



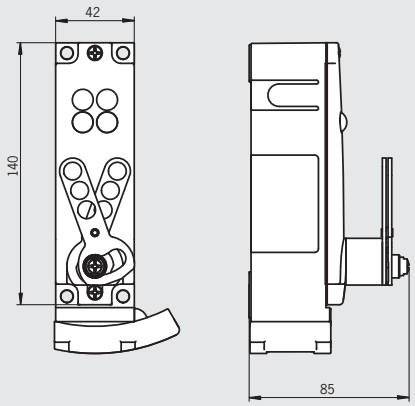
Safety switch CET-AP...
with plug connector RC18



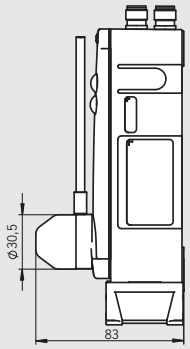
1) German Social Accident Insurance approval pending
2) No UL approval for version with plug connector RC18

Non-contact safety switches CET-AP...
with lockout mechanism

Dimension drawing

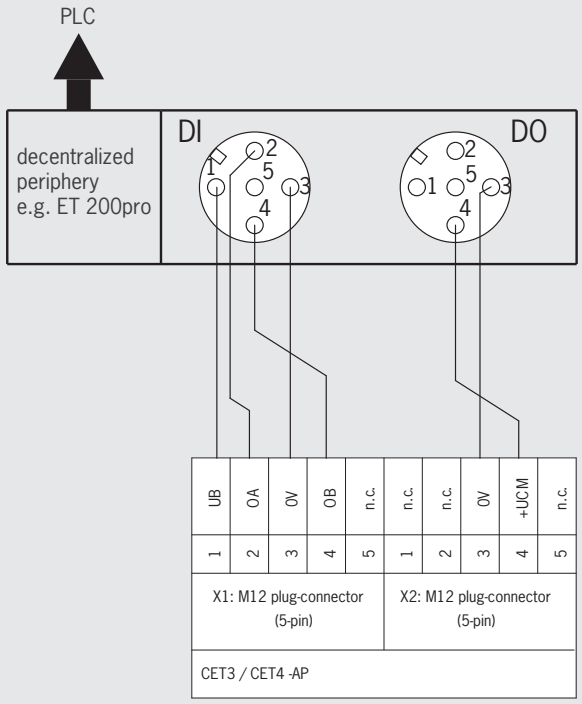


Non-contact safety switches CET-AP...
with wire front release



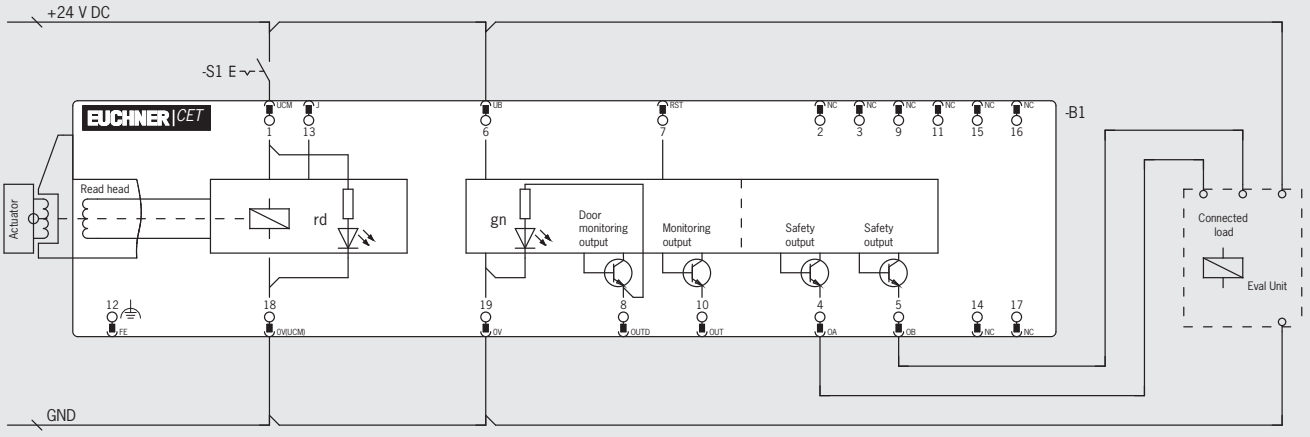
Wiring diagrams

Wiring diagram A



Connection example for connection to decentralized peripheral equipment

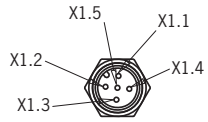
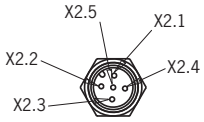
Wiring diagram B



Connection example for version with plug connector RC18

Safety switch CET.-AP for connection to decentralized peripheral equipment

Wiring diagram A

Plug connector (view of connection side)	Pin	Designation	Function	Wire color of connection cable [1]
2 x M12	X 1.1	U_B	Operating voltage, 24 V DC	BN
	X 1.2	0A	Safety output, channel 1	WH
	X 1.3	0V	Operating voltage, 0 V	BU
	X 1.4	0B	Safety output, channel 2	BK
	X 1.5	-	n.c.	GY
	X 2.1	-	n.c.	BN
	X 2.2	-	n.c.	WH
	X 2.3	0V UCM	0V solenoid	BU
	X 2.4	UCM	Operating voltage of guard locking solenoid, 24 V DC	BK
	X 2.5	-	n.c.	GY

1) Only for standard EUCHNER connection cable

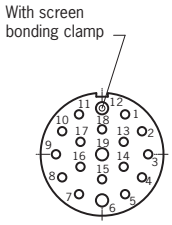
Ordering table CET.-AP for connection to decentralized peripheral equipment

Order no./item	Closed-circuit current principle	Open-circuit current principle	Door monitoring output	Unicode	Multicode	Single ramp	Double ramp	Teach-in input	Feedback loop	Escape release	Wire front release (L1 *)	Lockout mechanism	Wiring diagram
CET3													
111346 CET3-AP-CRA-AH-50X-SI-111346	●			●		●							A
114223 CET3-AP-CRA-AH-50X-SI-C2333-114223	●			●		●						●	A
114626 CET3-AP-CRA-AH-50F-SI-C2357-114626	●			●		●				105 mm		●	A
114073 CET3-AP-CRA-AH-50F-SI-114073	●			●		●				75 mm			A
114516 CET3-AP-CRA-AH-50F-SI-C2333-114516	●			●		●				75 mm		●	A
CET4													
112082 CET4-AP-CRA-AH-50X-SI-112082		●		●		●							A

* L1 = hose length; cable length = L1 + 1 m. Important: Handle must be ordered separately (see page 169).

Safety switch CET.-AP with plug connector RC18

Wiring diagram B

Plug connector (view of connection side)	Pin	Designation	Function	Wire color of connection cable [1]
RC18 With screen bonding clamp 	1	U_{CM}	Operating voltage of guard locking solenoid, 24 V DC	VT
	2	-	n.c.	RD
	3	-	n.c.	GY
	4	OA	Safety output, channel 1	RD/BU
	5	OB	Safety output, channel 2	GN
	6	U_B	Operating voltage of AR electronics, 24 V DC	BU
	7	RST	Reset input	GY/PK
	8	OUT D	Door monitoring output (only CET3-AR and CET4-AR)	GN/WH
	9	-	n.c.	YE/WH
	10	OUT	Monitoring output	GY/WH
	11	-	n.c.	BK
	12	FE	Function earth	GN/YE
	13	J	Version with teach-in input: To teach-in a new actuator, connect to 24 V DC; in normal operation connect to 0 V.	PK
	14	-	n.c.	BN/GY
	15	-	**Attention:** Do not connect to 0 V	BN/YE
	16	-	**Attention:** Do not connect to 0 V	BN/GN
	17	-	n.c.	WH
	18	0V U_{CM}	Operating voltage of guard locking solenoid 0 V	YE
	19	0V U_B	Operating voltage of AR electronics 0 V	BN

1) Only for standard EUCHNER connection cable

Ordering table CET.-AP with plug connector RC18

Order no./item	Closed-circuit current principle	Open-circuit current principle	Door monitoring output	Unicode	Multicode	Single ramp	Double ramp	Teach-in input	Feedback loop	Escape release	Wire front release (L1 *)	Lockout mechanism	Wiring diagram
CET3													
119106 CET3-AP-CRA-AH-50F-SH-C2312-119106	●			●		●		●		105 mm			B

* L1 = hose length; cable length = L1 + 1 m. Important: Handle must be ordered separately (see page 169).

Technical data for non-contact safety switches CET-AP...

Safety switches

Parameter	Value min.	Value typ.	Value max.	Unit
General				
Material, ramp	Stainless steel			
Material, safety switch housing	Die-cast aluminum			
Installation position	Any (recommendation: switch head downward)			
Degree of protection	IP 67 (screwed tight with the related mating connector)			
Safety class	III			
Degree of contamination	3			
Mechanical life	1 x 10^6 operating cycles			
Ambient temperature at U_B	-20	-	+55	°C
Actuator approach speed, max.	20			m/min
Locking force F_{max}	6,500			N
Locking force F_{Zh} in acc. with GS-ET-19	$F_{Zh} = F_{max}/1.3 = 5{,}000$			N
Mass	Approx. 1.0			kg
Degrees of freedom (actuator in recess) X, Y, Z	X and Y: ± 5; Z: ± 4			mm
Connection type (depending on version)	2 plug connectors M12, 5-pin or plug connector RC18			
Operating voltage U_B (reverse-polarity protected, regulated, residual ripple < 5%)	24 ± 15%			V DC
Current consumption I_B	80			mA
For the approval according to UL the following applies	Operation only with UL class 2 power supply, or equivalent measures			
Switching load according to UL	DC 24 V, class 2			
External fuse (operating voltage U_B)	0.5	-	3	A
External fuse (solenoid operating voltage U_{CM})	0.5	-	2	A
Resilience to vibration	according to EN 60947-5-2			
EMC protection requirements	acc. to EN IEC 60947-5-3			
Safety outputs OA/OB	Semiconductor outputs (p-switching, short circuit-proof)			
- Output voltage U_{OA}/U_{OB} [1)] HIGH U_{OA}/U_{OB} LOW U_{OA}/U_{OB}	 U_B - 1.5 0	 - -	 U_B 1	V DC
Switching current per safety output	1	-	200	mA
Utilization category according to EN 60947-5-2	DC-13 24V 200mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads			
Switching frequency	0.5			Hz
Repeat accuracy R acc. to EN IEC 60947-5-3	≤ 10			%
Monitoring outputs OUT and OUT D (optional)	(p-switching, short circuit-proof)			
Output voltage	0.8 x U_B	-	U_B	V DC
Max. load	-	-	50	mA
Teach-in input J or input feedback loop Y				
HIGH	15	-	U_{CM}	V
LOW	0	-	1	
Solenoid				
Solenoid operating voltage U_{CM} (reverse polarity protected, regulated, residual ripple < 5%)	DC 24 V +10%/-15%			
Current consumption solenoid I_{CM}	CET-1/3: 400, CET-2/4: 480			mA
Power consumption	Max. 12			W
Duty cycle	100			%
Freely configurable LEDs [2)]	**LED 1 red, LED 2 green**			
Operating voltage	20.4	-	26.4	V DC

Reliability values according to EN ISO 13849-1	Head downward or horizontal	Head upward	
Category	4	3	
Performance Level (PL)	e	e	
PFH_d	3.1 x 10^{-9} / h	4.29 x 10^{-8} / h	
Mission time	20	20	years

1) Values at a switching current of 50 mA without taking into account the cable lengths.
2) Can vary depending on version. See data sheet.

Actuator

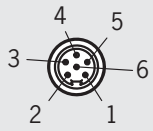
Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	Stainless steel			
Installation position	Active face opposite read head			
Degree of protection according to IEC/EN 60529	IP67			
Mechanical life	1 x 10^6 operating cycles			
Ambient temperature	-20	-	+55	°C
Locking force, max. (locked)	6,500			N
Mass	Approx. 0.25			kg
Stroke max.	15			mm
Power supply	Inductive, via read head			

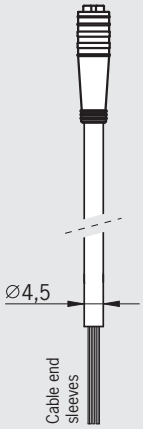
Connection cables with plug connectors

Flying lead Snap-on, 6-pin	**Flying lead** **straight**, M8 socket, 4-pin	**Flying lead** **angled**, M8 socket, 4-pin

Dimension drawing

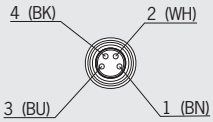
View of connection side

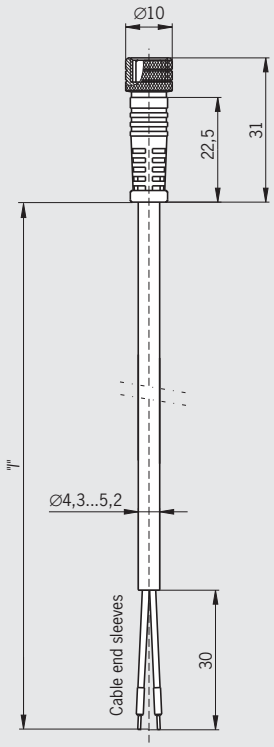




1 = BN ▶ U_B
2 = WH ▶ OA
3 = BU ▶ 0 V
4 = BK ▶ OB
5 = GY ▶ OUT
6 = PK ▶ NC

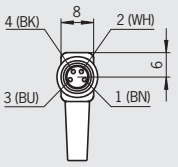
View of connection side

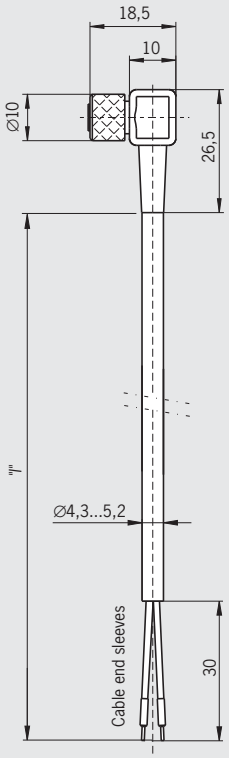




1 = BN ▶ U_B
2 = WH ▶ FO1A
3 = BU ▶ 0 V
4 = BK ▶ FO1B

View of connection side



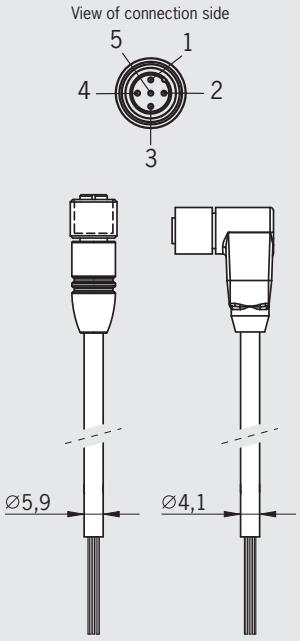


1 = BN ▶ U_B
2 = WH ▶ FO1A
3 = BU ▶ 0 V
4 = BK ▶ FO1B

For ordering table see page 157.

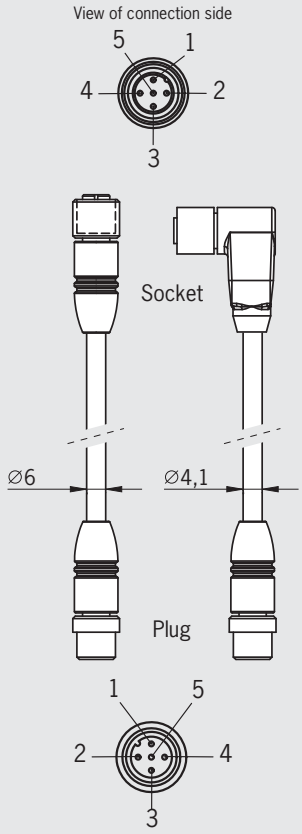
Connection cables with plug connectors

Flying lead
M12 female connector 5-pin



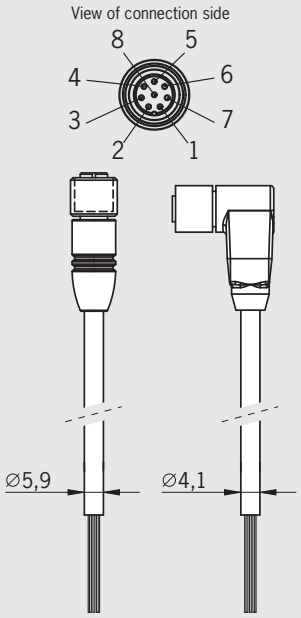
1 = BN	▶	U_B
2 = WH	▶	OA
3 = BU	▶	0 V
4 = BK	▶	OB
5 = GY	▶	DIA/OUT

Plug on both ends
M12 plug and female connector 5-pin



1 = BN	▶	U_B
2 = WH	▶	OA
3 = BU	▶	0 V
4 = BK	▶	OB
5 = GY	▶	DIA/OUT

Flying lead
M12 female connector 8-pin



1 = WH	▶	IB
2 = BN	▶	UB
3 = GN	▶	OA
4 = YE	▶	OB
5 = GY	▶	DIA
6 = PK	▶	IA
7 = BU	▶	0 V
8 = RD	▶	RST

Ordering table see next page.

Ordering table connection cables PVC with plug connector

Series		Comment	Order no./item
click 6 pin	**PVC connection cable with snap-on, 6-core, flying lead, 6 x 0.14 mm²** for the connection of one CES-AP-C.2-..-SF	Snap-on, 6-pin, length 5 m	**103556** C-R08F06-06X014PV05,0-ES-103556
		Snap-on, 6-pin, length 10 m	**103557** C-R08F06-06X014PV10,0-ES-103557
		Snap-on, 6-pin, length 15 m	**103558** C-R08F06-06X014PV15,0-ES-103558
		Snap-on, 6-pin, length 20 m	**103559** C-R08F06-06X014PV20,0-ES-103559
		Snap-on, 6-pin, length 25 m	**103560** C-R08F06-06X014PV25,0-ES-103560
M8 4 pin	**M8 connection cable PVC 4-core, flying lead, 4 x 0.25 mm²** for the connection of one CES-I-AP-.-C04-SK-…	M8 female connector 4-pin, length 5 m	**088813** C-M08F04-04X025PV05,0-ES-088813
		M8 female connector 4-pin, length 10 m	**088814** C-M08F04-04X025PV10,0-ES-088814
		M8 female connector 4-pin, length 15 m	**088815** C-M08F04-04X025PV15,0-ES-088815
		M8 female connector 4-pin, length 25 m	**095035** C-M08F04-04X025PV25,0-ES-095035
		M8 female connector, angled, 4-pin, length 10 m	**084703** C-M08F04-04X025PV10,0-ES-084703
M12 5 pin	**M12 connection cable PVC 5-core, flying lead, 5 x 0.34 mm²** for the connection of one CES-AP-C01-..-SB / CES-AP-C.2-..-SB / CES-I-AP-.-US.-… / CET.-AP	M12 female connector 5-pin, length 5 m	**100183** C-M12F05-05X034PV05,0-MA-100183
		M12 female connector 5-pin, length 10 m	**100184** C-M12F05-05X034PV10,0-MA-100184
		M12 female connector 5-pin, length 20 m	**100185** C-M12F05-05X034PV20,0-MA-100185
	M12 extension PVC 5-core, connectors at both ends	M12 female connector 5-pin to M12 plug connector, length 5 m	**100180** C-M12F05-05X034PV05,0-M12M05-100180
		M12 female connector 5-pin to M12 plug connector, length 10 m	**100181** C-M12F05-05X034PV10,0-M12M05-100181
		M12 female connector 5-pin to M12 plug connector, length 20 m	**100182** C-M12F05-05X034PV20,0-M12M05-100182
M12 8 pin	**M12 connection cable PVC 8-core, flying lead, 8 x 0.25 mm²** for the connection of one CES-AP-C01-..-SA	M12 female connector 8-pin, length 5 m	**100177** C-M12F08-08X025PV05,0-MA-100177
		M12 female connector 8-pin, length 10 m	**100178** C-M12F08-08X025PV10,0-MA-100178
		M12 female connector 8-pin, length 20 m	**100179** C-M12F08-08X025PV20,0-MA-100179

Ordering table connection cables PUR with plug connector

Series		Comment	Order no./item
M8 4 pin	**M8 connection cable PUR 4-core, flying lead, 4 x 0.34 mm²** for the connection of one CES-I-AP-.-C04-SK-…	M8 female connector 4-pin, length 5 m	**116049** C-M08F04-04X034PU05,0-ES-116049
		M8 female connector 4-pin, length 10 m	**116050** C-M08F04-04X034PU10,0-ES-116050
		M8 female connector 4-pin, length 20 m	**116051** C-M08F04-04X034PU20,0-ES-116051
M12 5 pin	**M12 connection cable PUR 5-core, flying lead, 5 x 0.25 mm²** for the connection of one CES-AP-C.1-..-SB / CES-AP-C.2-..-SB / CES-I-AP-.-US.-… / CET.-AP	M12 female connector, angled, 5-pin, length 10 m, cable outlet right	**113190** C-M12F05-05X025P10,0-MA-113190
		M12 female connector, angled, 5-pin, length 10 m, cable outlet left	**113187** C-M12F05-05X025P10,0-MA-113187
	M12 extension PUR 5-core, connectors at both ends for the connection of one CET.-AP to decentralized peripheral equipment	M12 female connector, 5-pin to M12-plug connector, length 10 m, cable outlet right	**115566** C-M12F05-05X025P10,0-M12M05-115566
		M12 female connector, 5-pin to M12 plug connector, length 10 m, cable outlet left	**115565** C-M12F05-05X025P10,0-M12M05-115565
M12 8 pin	**M12 connection cable PUR 8-core, flying lead, 8 x 0.25 mm²** for the connection of one CES-AP-C01-..-SA	M12 female connector, angled, 8-pin, length 10 m, cable outlet right	**113189** C-M12F08-08X025PU10.0-MA-113189
		M12 female connector, angled, 8-pin, length 10 m, cable outlet left	**113188** C-M12F08-08X025PU10.0-MA-113188

Connection cables with plug connectors

Technical data for connection cable PVC with snap-on

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		6-pin female connector, straight		
Connection		Snap-action		
Conductor cross-section		6 x 0.14		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PVC ∅ 4.5		mm
Static bending radius		min. 5 x cable diameter		mm

Technical data for M8 connection cable PVC, 4-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		4-pin M8 female connector		
Connection		Screw terminal		
Conductor cross-section		4 x 0.25		mm²
Material, connector housing		PUR black		
Material, outer sheath		PVC ∅ 4.3 ... 5.2		mm
Material, union nut		CuZn nickel-plated		
Static bending radius		min. 5 x cable diameter		mm

Technical data for M8 connection cable PUR, 4-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		4-pin M8 female connector, straight		
Connection		Screw terminal		
Conductor cross-section		4 x 0.34		mm²
Material, connector housing		TPU black		
Material, outer sheath		PUR ∅ 4.7		mm
Material, union nut		CuZn nickel-plated		
Static bending radius		min. 5 x cable diameter		mm

Technical data for M12 connection cable PVC, 5-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		5-pin M12 female connector, straight		
Connection		Screw terminal		
Conductor cross-section		5 x 0.34		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PVC ∅ 5.9		mm
Bending radius		min. 5 x cable diameter		mm

Technical data for M12 connection cable PUR, 5-core, with female connector, angled

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		5-pin M12 female connector, angled		
Connection		Screw terminal		
Conductor cross-section		5 x 0.25		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PUR ∅ 4.1		mm
Static bending radius		min. 5 x cable diameter		mm

Technical data for M12 connection cable PVC, 8-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		8-pin M12 female connector, straight		
Connection		Screw terminal		
Conductor cross-section		8 x 0.25		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PVC ∅ 5.9		mm
Static bending radius		min. 5 x cable diameter		mm

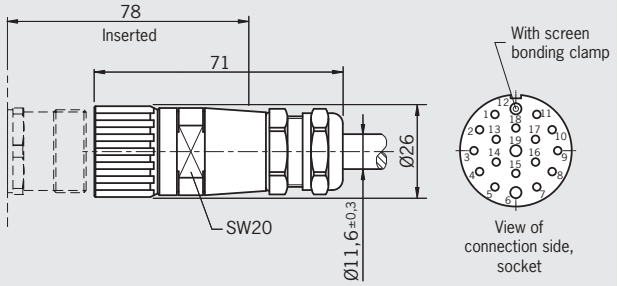
Technical data for M12 connection cable PUR, 8-core, with female connector, angled

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		8-pin M12 female connector, angled		
Connection		Screw terminal		
Conductor cross-section		8 x 0.25		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PVC ∅ 5.2		mm
Static bending radius		min. 5 x cable diameter		mm

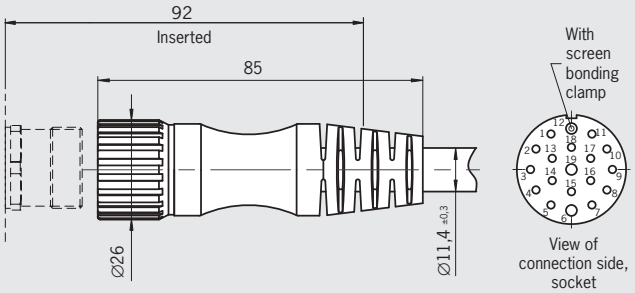
Connection cables with plug connector RC18 for CET-AP

Female connector RC18 with cable
18-pin + PE

Dimension drawing

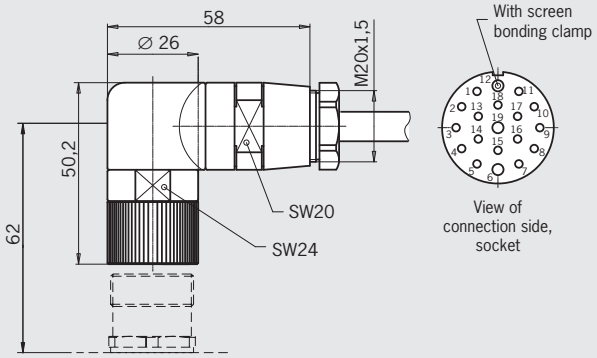


Female connector RC18 with cable halogen-free
18-pin + PE

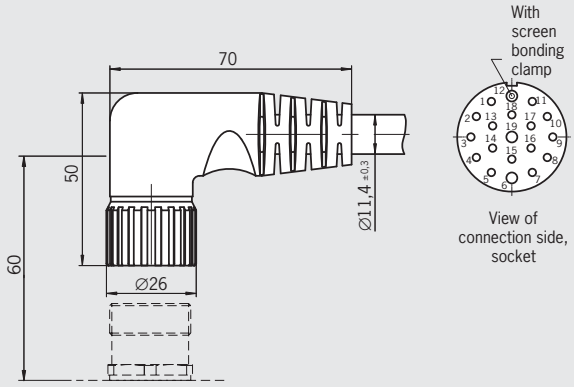


Female connector RC18 angled with cable
18-pin + PE

Dimension drawing



Female connector RC18 angled with cable halogen-free
18-pin + PE



Assignment of connection cable RC18 for CET-AP

Pin	Core color	Conductor cross-section [mm]	Pin	Core color	Conductor cross-section [mm]
1	VT	0.5	11	BK	0.5
2	RD	0.5	12	GN/YE	1.0
3	GY	0.5	13	PK	0.5
4	RD/BU	0.5	14	BN/GY	0.5
5	GN	0.5	15	BN/YE	0.5
6	BU	1.0	16	BN/GN	0.5
7	GY/PK	0.5	17	WH	0.5
8	GN/WH	0.5	18	YE	0.5
9	YE/WH	0.5	19	BN	1.0
10	GY/WH	0.5			

Ordering table see next page.

Connection cables with plug connector RC18 for CET-AP

Ordering table

Designation	Cable length [m]	Order no./item
Female connector RC18 with cable PUR for CET-AP 18-pin + PE	1.5	**092761** RC18EF1,5M-C1825
	3	**092816** RC18EF3M-C1825
	6	**077014** RC18EF6M-C1825
	8	**077015** RC18EF8M-C1825
	10	**092898** RC18EF10M-C1825
	15	**077016** RC18EF15M-C1825
	20	**092726** RC18EF20M-C1825
	25	**092727** RC18EF25M-C1825
	30	**095993** RC18EF30M-C1825
Female connector RC18 with cable PUR halogen-free, suitable for drag chain for CET-AP 18-pin + PE	1.5	**092883** RC18EF1,5MF-C1825
	3	**092884** RC18EF3MF-C1825
	6	**092885** RC18EF6MF-C1825
	8	**092886** RC18EF8MF-C1825
	10	**092887** RC18EF10MF-C1825
	15	**092888** RC18EF15MF-C1825
	20	**092889** RC18EF20MF-C1825
	25	**092890** RC18EF25MF-C1825
	30	**109681** RC18EF30MF-C1825

Designation	Cable length [m]	Order no./item	
		Cable outlet left	Cable outlet right
Female connector RC18 angled with cable PUR for CET-AP 18-pin + PE	1.5	**092906** RC18WF1,5ML-C1825	**092907** RC18WF1,5MR-C1825
	3	**092908** RC18WF3ML-C1825	**092909** RC18WF3MR-C1825
	6	**077018** RC18WF6ML-C1825	**085194** RC18WF6MR-C1825
	8	**077019** RC18WF8ML-C1825	**085195** RC18WF8MR-C1825
	10	**092901** RC18WF10ML-C1825	**092902** RC18WF10MR-C1825
	15	**077020** RC18WF15ML-C1825	**085196** RC18WF15MR-C1825
	20	**092910** RC18WF20ML-C1825	**092911** RC18WF20MR-C1825
	25	**092912** RC18WF25ML-C1825	**092913** RC18WF25MR-C1825
Female connector RC18 angled with cable PUR halogen-free suitable for drag chain for CET-AP 18-pin + PE	1.5	**092891** RC18WF1,5MLF-C1825	**092892** RC18WF1,5MRF-C1825
	3	**092893** RC18WF3MLF-C1825	**092894** RC18WF3MRF-C1825
	6	**092697** RC18WF6MLF-C1825	**092698** RC18WF6MRF-C1825
	8	**092895** RC18WF8MLF-C1825	**092896** RC18WF8MRF-C1825
	10	**092699** RC18WF10MLF-C1825	**092700** RC18WF10MRF-C1825
	15	**092701** RC18WF15MLF-C1825	**092702** RC18WF15MRF-C1825
	20	**092704** RC18WF20MLF-C1825	**092708** RC18WF20MRF-C1825
	25	**092724** RC18WF25MLF-C1825	**092725** RC18WF25MRF-C1825

Technical data for female connector RC18, straight/angled, with cable

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		Female connector 19-pin, PE with screen bonding clamp		
Connection		Screw terminal		
Conductor cross-section		16 x 0.5 / 3 x 1.0		mm²
Material, connector housing		CuZn		
Material, outer sheath		Polyurethane		
Bending radius		min. 10 x cable diameter		mm

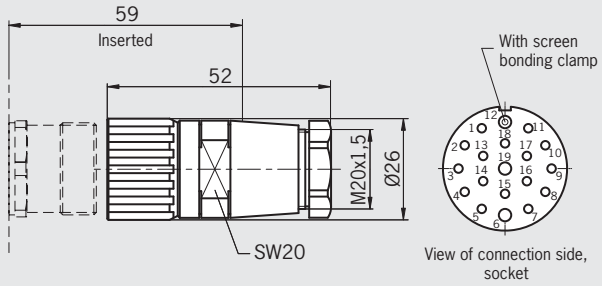
Technical data for female connector RC18, straight/angled, with halogen-free cable

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		Female connector 19-pin, PE with screen bonding clamp		
Connection		Screw terminal		
Conductor cross-section		16 x 0.5 / 3 x 1.0		mm²
Material, connector housing		Polyurethane, halogen-free		
Material, outer sheath		Polyurethane, halogen-free		
Material, union nut		CuZn		
Bending radius		min. 10 x cable diameter		mm

Female connector RC18 CET-AP

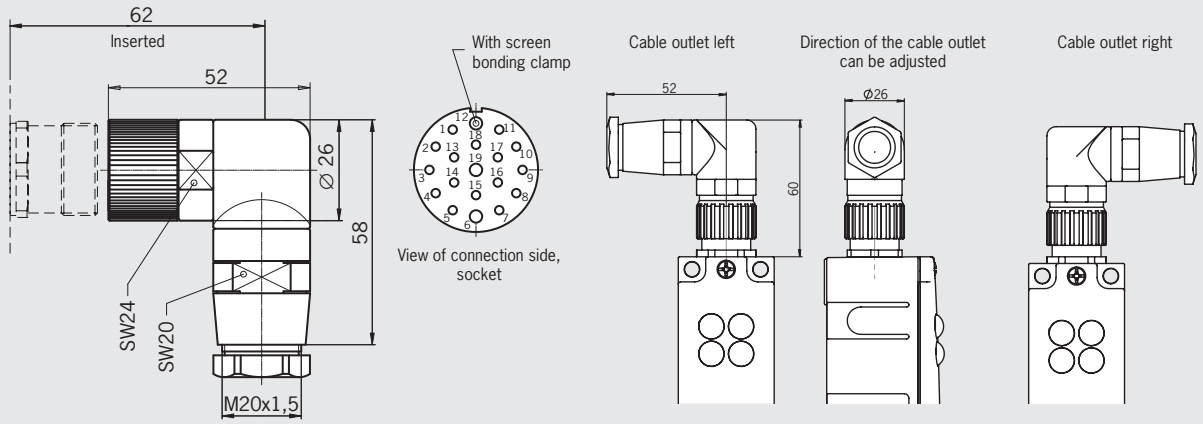
Female connector RC18
18-pin + PE

Dimension drawing



Female connector RC18 angled
18-pin + PE, direction of the cable outlet can be adjusted

Dimension drawing



Ordering table

Series	Comment	Order no.
RC18 [1] 18-pin + PE	**EF** Female connector	**074616** RC18EF
	WF Female connector angled	**074617** RC18WF
	Replacement pin crimp contacts Conductor cross-section 19 x 0.75 - 1 mm2	**094309** Pin crimp contact RCM

1) Crimp contacts included

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Grip material		CuZn nickel-plated		
Degree of protection acc. to EN 60529		IP65 (inserted)		

Mounting sets AM-SET...

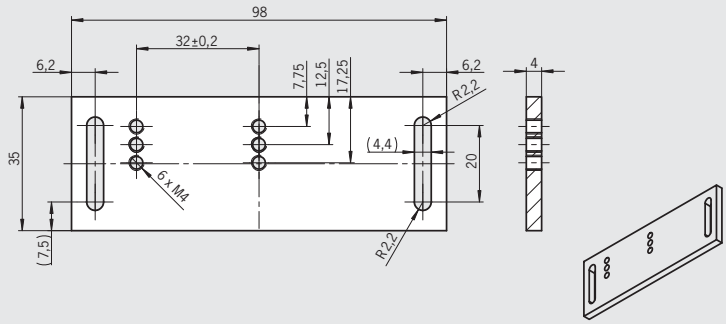
- **Mounting plate**
- **Angle mounting plate**
- **Spacer**

Ideal for profile mounting of CES switches and actuators with housing design C04.
For aluminum standard profiles 30x30 to 45x45 and Bosch EcoSafe profiles.

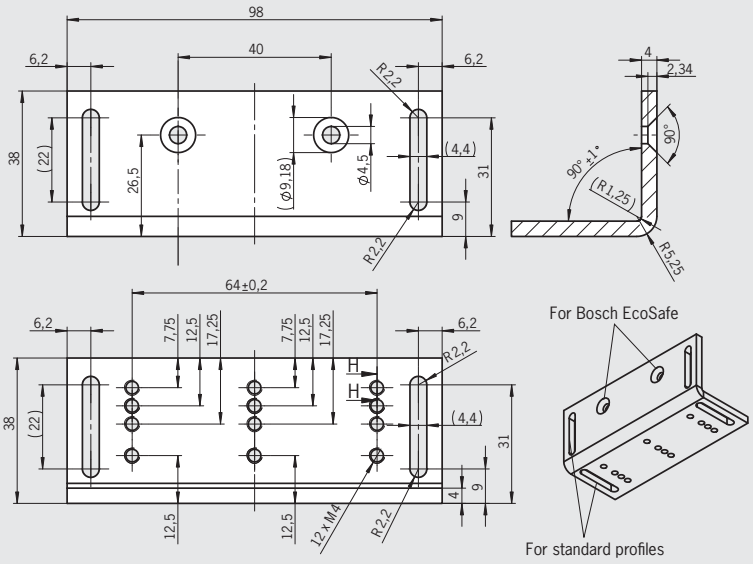
Which set for which application?
Installation examples for the individual sets can be found on the next page and at www.EUCHNER.de. Simply enter document number 120300 in the search box.

Mounting plate
for safety switch CES-I-AP-.-C04

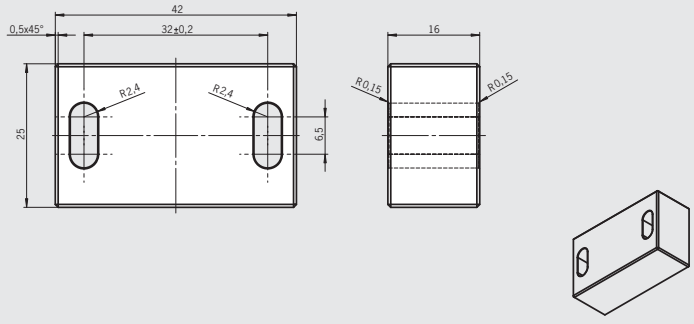
Dimension drawing



Angle mounting plate
for safety switch CES-I-AP-.-C04



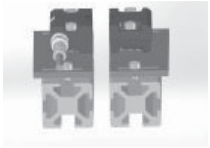
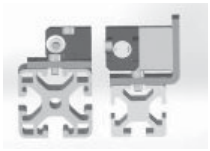
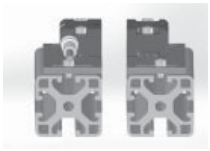
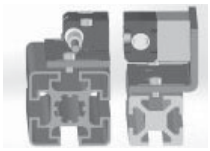
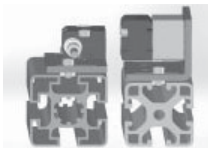
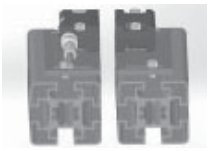
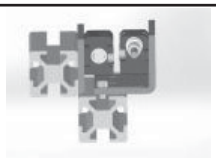
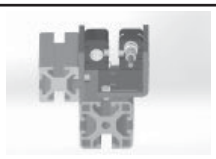
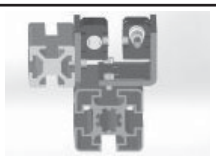
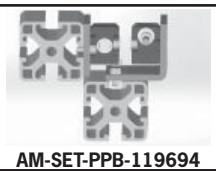
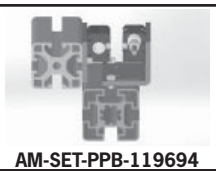
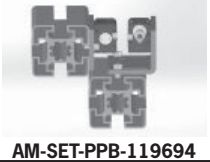
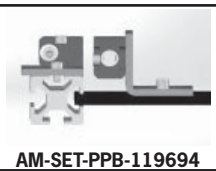
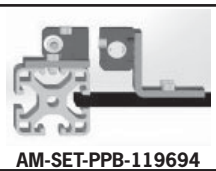
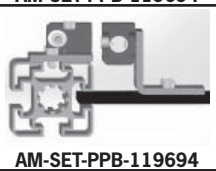
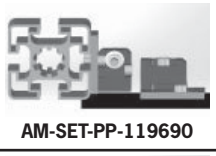
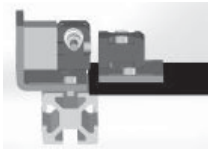
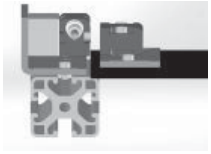
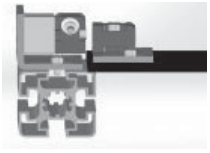
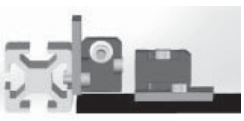
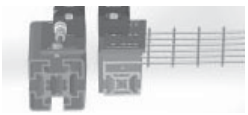
Spacer
for safety switch CES-I-AP-.-C04



Ordering table

Designation	Remark/use	Order no./item
AM-SET-PP	Set consisting of two mounting plates	**119690** AM-SET-PP-119690
AM-SET-PPB	Set consists of a mounting plate, an angle mounting plate and a spacer	**119694** AM-SET-PPB-119694

Installation examples for mounting sets AM-SET-PP and AM-SET-PPB

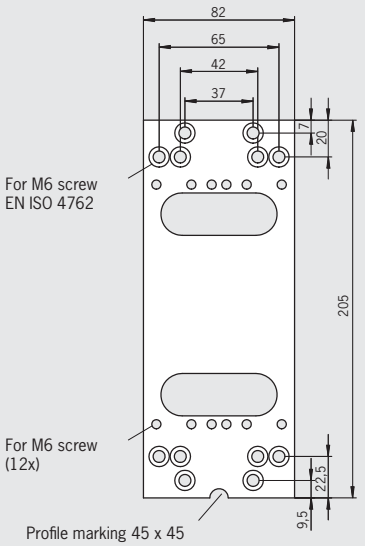
Matrix of installation situations			Profile 30 x 30	Profile 40 x 40	Profile 45 x 45
1	Profile 30 x 30, hinged door Profile 30 x 30, sliding door		 **AM-SET-PP-119690**	Not customary	Not customary
2	Profile 40 x 40, hinged door Profile 40 x 40, sliding door		 **AM-SET-PPB-119694**	 **AM-SET-PP-119690**	Not customary
3	Profile 45 x 45, hinged door Profile 45 x 45, sliding door		 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**	 **AM-SET-PP-119690**
4	Profile 30 x 30, sliding door with offset		 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**
5	Profile 40 x 40, sliding door with offset		Not customary	 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**
6	Profile 45 x 45, sliding door with offset		Not customary	Not customary	 **AM-SET-PPB-119694**
7	Hinged or sliding door of Plexiglas, center of profile		 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**
8	Hinged or sliding door of Plexiglas with offset (mounted at rear (concealed))		 **AM-SET-PP-119690**	 **AM-SET-PP-119690**	 **AM-SET-PP-119690**
9	Hinged or sliding door of Plexiglas with offset (mounted at front)		 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**	 **AM-SET-PPB-119694**
10	Hinged or sliding door of Plexiglas with profile flush at front		 **AM-SET-PP-119690**	 **AM-SET-PP-119690**	 **AM-SET-PP-119690**
11	Bosch EcoSafe (mounted at front/rear)		Bosch EcoSafe is available only in combination with profile 45 x 45 for EcoSafe (30 x 30)		 **AM-SET-PPB-119694**

Mounting plate CET

- **Mounting plate for safety switch CET for hinged or sliding doors**
- **Suitable for aluminum profiles 40 ... 45 mm**
- **Horizontal and vertical mounting**
- **Made of aluminum**
- **Suitable for CET with escape release**

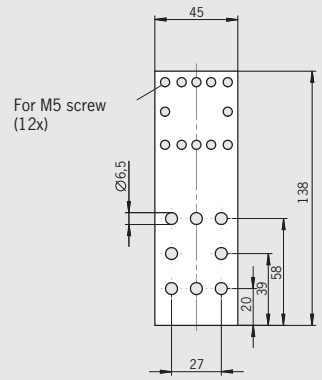
Mounting plate EMP-L-CET
for read head CET

Dimension drawing



Material thickness 10 mm

Mounting plate EMP-B-CET
for actuator CET

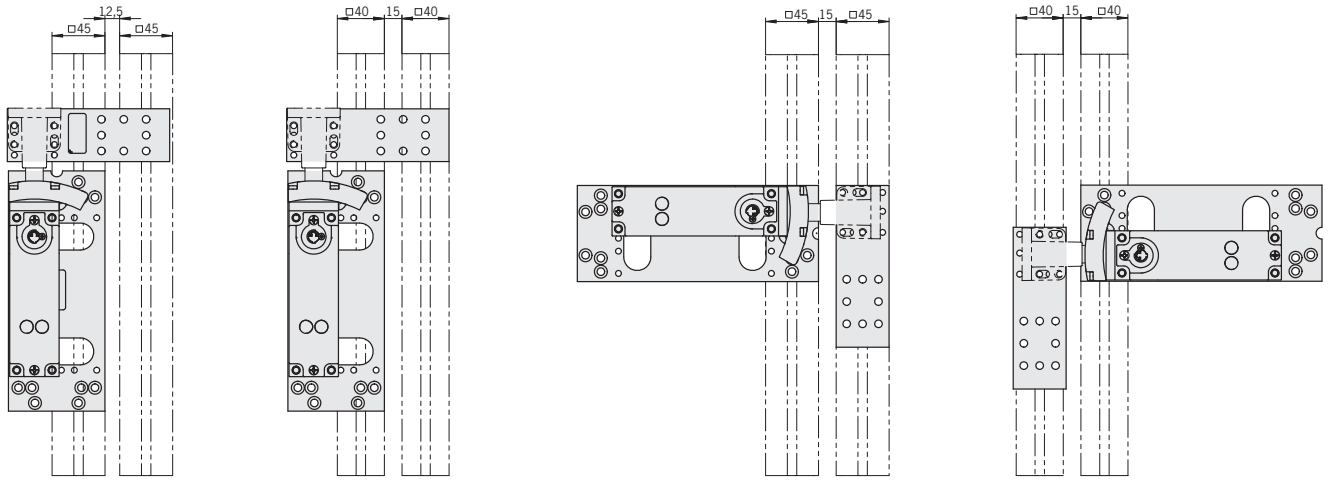


Material thickness 10 mm

Ordering table

Designation	Use	Order no./item
Mounting plate EMP-L-CET	**for safety switch CET**	**106695** EMP-L-CET
Mounting plate EMP-B-CET	**for actuator CET**	**106694** EMP-B-CET

Installation example mounting plates EMP-.-CET



Safety screws

Ordering table

Fixing material/ screw size	Version/usage	Packaging unit [qty.]	Order no.
Safety screws **M4 x 14** (small head)	Actuator CES-A-BBA, CES-A-BCA	20	**071863**
Safety screws **M4 x 14** (large head)	Safety switch CES-AP-C.2 and actuator CES-A-BLN-.2	100	**086232**
Safety screws **M5 x 16**	Actuator CES-A-BRN, CET-A-BWK	100	**073456**
Safety screws **M5 x 10**	Actuator CES-A-BPA	100	**073455**
Safety screws **M4 x 20**	Safety switch CES-I-AP-…-C04 and actuator CES-A-BBN-C04-…	20	**116978**

Miscellaneous accessories

- **Mechanical key release for safety switch CET**
- **Emergency unlocking for safety switch CET**
- **Handle for wire front release for safety switch CET**

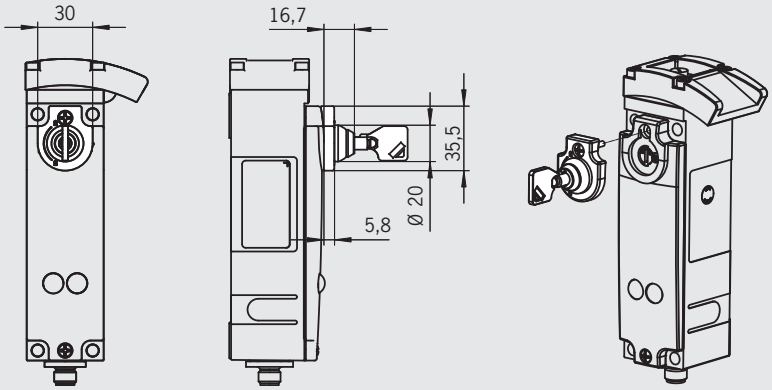
Mechanical key release

The mechanical key release is used in combination with safety switch CET. It enables authorized personnel to actuate the mechanical release using the related key. The unlocking mechanism holds the solenoid in the "unlocked" position.
A screw is used to fix the lock to the cover of the safety switch CET (over the mechanical release). The lock is identical locking.

- Order safety switch CET separately
- 2 keys included (for spare keys see ordering table below)
- Every safety switch in the CET series can be upgraded with the mechanical key release.

Mechanical key release
for safety switch CET

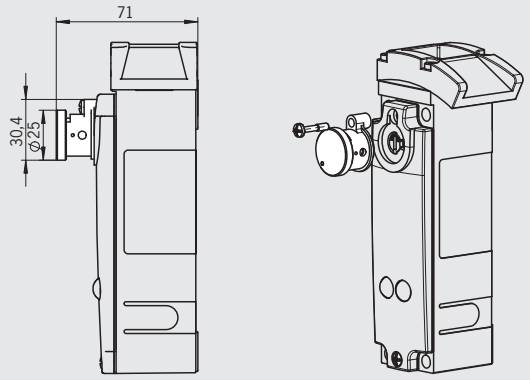
Dimension drawing



Emergency unlocking

Using the emergency unlocking the safety switch can be unlocked manually. In the locked position of the emergency unlocking, a ball detent mechanism prevents unintentional unlocking of the safety switch due to vibration or similar.
In the unlocked position of the emergency unlocking, an integrated bolt engages in a bore on the flange. To reset the emergency unlocking, first the bolt must be pressed inwards, out of the detent mechanism, using a tool.
The emergency unlocking can be lead-sealed (lead seal kit order no. 087256).

Emergency unlocking
for safety switch CET



Ordering table

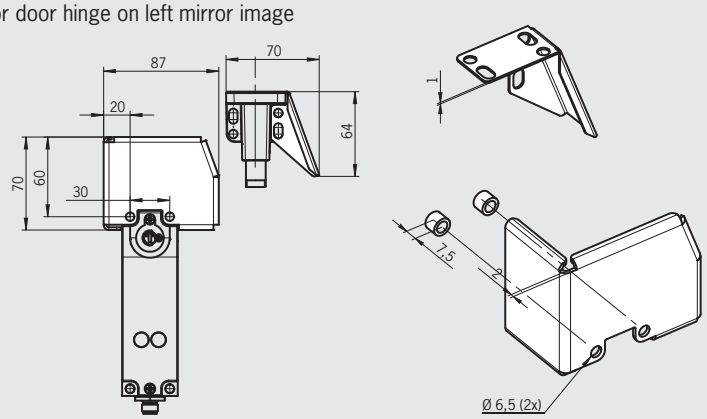
Designation	Use	Version	Order no./item
Mechanical key release	for safety switch CET	identical locking, incl. 2 keys	**098850** Mechanical key release
Replacement key	for mechanical key release, identical locking	2 keys, identical locking	**099434** Replacement key
Emergency unlocking	for safety switch CET	latching in both positions	**103714** Emergency unlocking CET
Lead seal kit	for emergency unlocking		**087256** Lead seal kit for emergency unlocking
Handle for wire front release	for safety switch CET-AP with wire front release		**099795** Handle for wire front release

- **Cover for safety switch CET**
- **Double ramp for safety switch CET**

Cover
With the CET cover, tampering with the safety switch CET is effectively prevented.
The cover prevents the use of simple tools to manually press up the actuator.

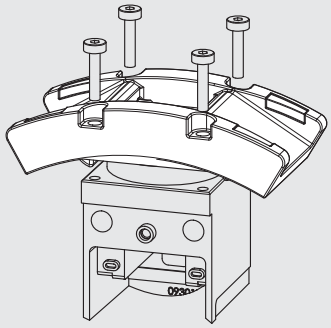
Cover
for safety switch and actuator CET

Cover for door hinge on left mirror image



Double ramp
The ramp can be approached from two sides. It can be passed over, e.g. for sliding doors.

Double ramp
for safety switch CET



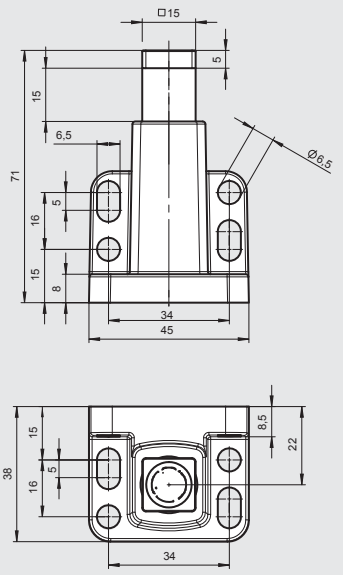
Ordering table

Designation	Use	Version	Order no./item
Cover	for safety switch CET and actuator CET	door hinge right	**098808** CET cover right
		door hinge left	**098807** CET cover left
Double ramp	for safety switch CET		**114091** Double ramp for CET

Miscellaneous accessories

- **Actuator for safety switch CET**

Actuator CET-A-BWK-50X
for safety switch CET-AP

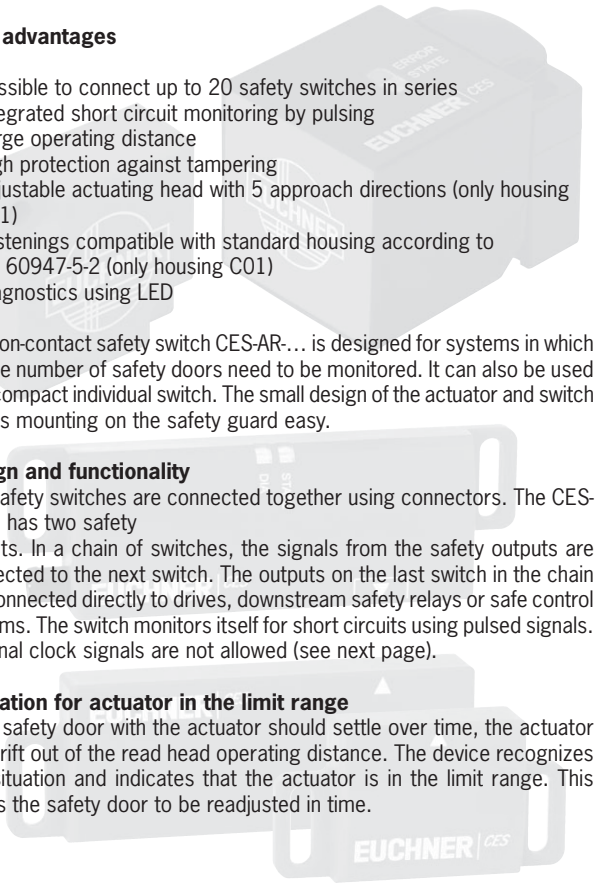


4 safety screws
M5x16 included

Ordering table

Designation	Version/usage	Order no./item
Actuator for CET...	4 safety screws M5x16 included	**096327** CET-A-BWK-50X

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



Your advantages

- Possible to connect up to 20 safety switches in series
- Integrated short circuit monitoring by pulsing
- Large operating distance
- High protection against tampering
- Adjustable actuating head with 5 approach directions (only housing C01)
- Fastenings compatible with standard housing according to EN 60947-5-2 (only housing C01)
- Diagnostics using LED

The non-contact safety switch CES-AR-... is designed for systems in which a large number of safety doors need to be monitored. It can also be used as a compact individual switch. The small design of the actuator and switch makes mounting on the safety guard easy.

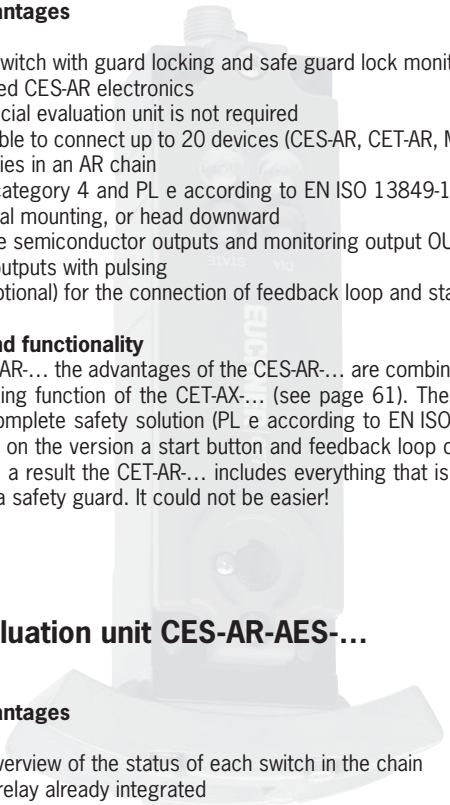
Design and functionality
The safety switches are connected together using connectors. The CES-AR-... has two safety
outputs. In a chain of switches, the signals from the safety outputs are connected to the next switch. The outputs on the last switch in the chain are connected directly to drives, downstream safety relays or safe control systems. The switch monitors itself for short circuits using pulsed signals. External clock signals are not allowed (see next page).

Indication for actuator in the limit range
If the safety door with the actuator should settle over time, the actuator can drift out of the read head operating distance. The device recognizes this situation and indicates that the actuator is in the limit range. This allows the safety door to be readjusted in time.

Tip!

You can also incorporate devices from the system family MGB-...-AR... (Multifunctional Gate Box) in a CES-AR switch chain. You will find more detailed information in the catalog Multifunctional Gate Box MGB and in the MGB operating instructions at www.EUCHNER.de.

Non-contact safety switches CET-AR-... with guard locking and guard lock monitoring



Your advantages

- Safety switch with guard locking and safe guard lock monitoring
- Integrated CES-AR electronics
  - A special evaluation unit is not required
  - Possible to connect up to 20 devices (CES-AR, CET-AR, MGB-AR,...) in series in an AR chain
- Safety category 4 and PL e according to EN ISO 13849-1 in case of horizontal mounting, or head downward
- Two safe semiconductor outputs and monitoring output OUT
- Safety outputs with pulsing
- Input (optional) for the connection of feedback loop and start button

Design and functionality
In the CET-AR-... the advantages of the CES-AR-... are combined with the guard locking function of the CET-AX-... (see page 61). The CET-AR-... forms a complete safety solution (PL e according to EN ISO 13849-1). Depending on the version a start button and feedback loop can be connected. As a result the CET-AR-... includes everything that is necessary to secure a safety guard. It could not be easier!

AR evaluation unit CES-AR-AES-...

Your advantages

- Quick overview of the status of each switch in the chain
- Safety relay already integrated
- Reduced wiring effort due to AR technology
- Easy to service due to plug-in connection terminals

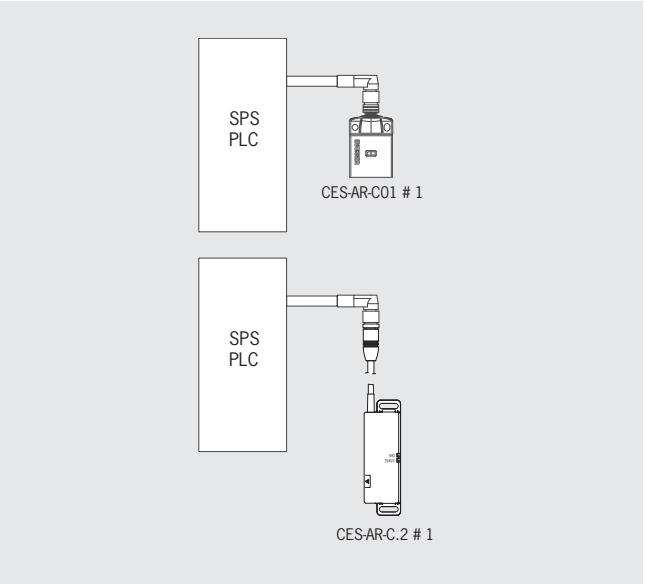
Design and functionality
Using the AR evaluation unit AR switch chains with up to 12 devices can be evaluated. All relevant status information on the switches connected is routed to the evaluation unit using only two inputs. The four safety outputs are switched depending on these input signals. Connected parts of the safety circuit, e.g. contactors, can be monitored via a feedback loop. The system can be started either manually using a start button or automatically. With a total of 14 monitoring outputs, the CES-AR-AES supplies downstream control systems with information on the switching state as well as any diagnostic messages present.

Connection to safe control systems or safety relays
Do not use a control system or safety relay with pulsing for monitoring short circuits or switch off the pulsing function in these devices. The switch generates its own clock signals on the output lines OA/OB. A downstream device must tolerate these test pulses, which may have a length of up to 1 ms.
The inputs on the downstream device must be suitable for positive-switching devices (pnp outputs), as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.

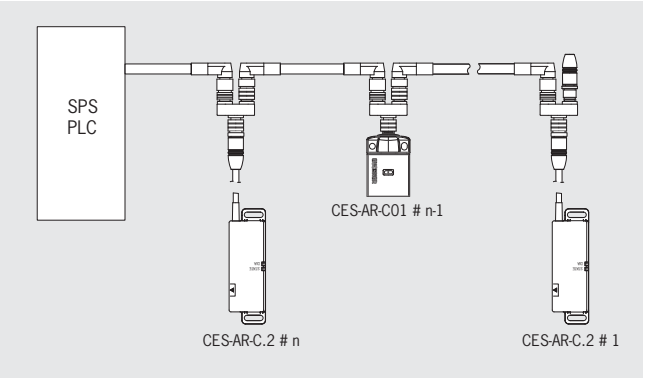
OUT output
The semiconductor output OUT is switched if the safety guard is closed (actuator in the operating distance). It is not allowed to be used for safety functions. The OUT outputs on the individual switches can, however, not be polled if connected in series using a Y-distributor. Evaluation is only possible on parallel wiring to the control cabinet.

RST input
The switches in a chain in a fault state can be reset using the RST input. To do this, a voltage of 24 V is applied to the RST input for at least 3 seconds. It is not necessary to disconnect the supply of power to reset a fault.

Usage as individual switch or switch chain
The safety switch CES-AR/CET-AR can be operated as a compact individual switch or in a switch chain with max. 20 devices.



If a single CES-AR/CET-AR is used, connect the device as shown in figure above. The OUT output can also be connected here to a control system as a monitoring output.



The switches are connected in series using plug connectors and Y-distributors. The first switch in the chain must always be fitted with a bridging plug. If a safety door is opened or if a fault occurs on one of the switches, the system shuts down the machine. A higher level control system can, however, not detect which safety door is open or on which switch a fault has occurred.
A special AR evaluation unit is required for this purpose (see page 169).

Typical system times CES-AR

Ready delay
After switching on, the unit carries out a self-test for 8 s. The system is ready for operation only after this time.

Switch-on time of safety outputs
The max. reaction time from the moment when the actuator is at the operating distance (safety door closed) to the moment when the safety outputs switch on Ton is 400 ms.

Simultaneity monitoring, safety inputs IA/IB
If the safety inputs have different switching states for longer than 150 ms, the safety outputs OA/OB will be switched off.

Risk time according to EN 60947-5-3
If an actuator moves outside the operating distance, the safety outputs OA and OB on the corresponding safety switch are deactivated after a maximum of 360 ms.

Difference time
The safety outputs OA and OB switch with a slight time offset. They have the same signal state at the latest after a difference time of 10 ms.

Typical system times CET-AR

Ready delay
After switching on, the unit carries out a self-test for 8 s. The system is ready for operation only after this time.

Switch-on time of safety outputs
The max. reaction time from the moment when the safety guard is locked to the moment when the safety outputs switch on Ton is 400 ms.

Simultaneity monitoring, safety inputs IA/IB
If the safety inputs have different switching states for longer than 150 ms, the safety outputs OA/OB will be switched off. The device switches to fault state.

Risk time according to EN 60947-5-3
If an actuator moves outside the operating distance, the safety outputs OA and OB on the corresponding safety switch are deactivated after a maximum of 500 ms.

Difference time
The safety outputs OA and OB switch with a slight time offset. They have the same signal state at the latest after a difference time of 10 ms.

LED displays CES-AR

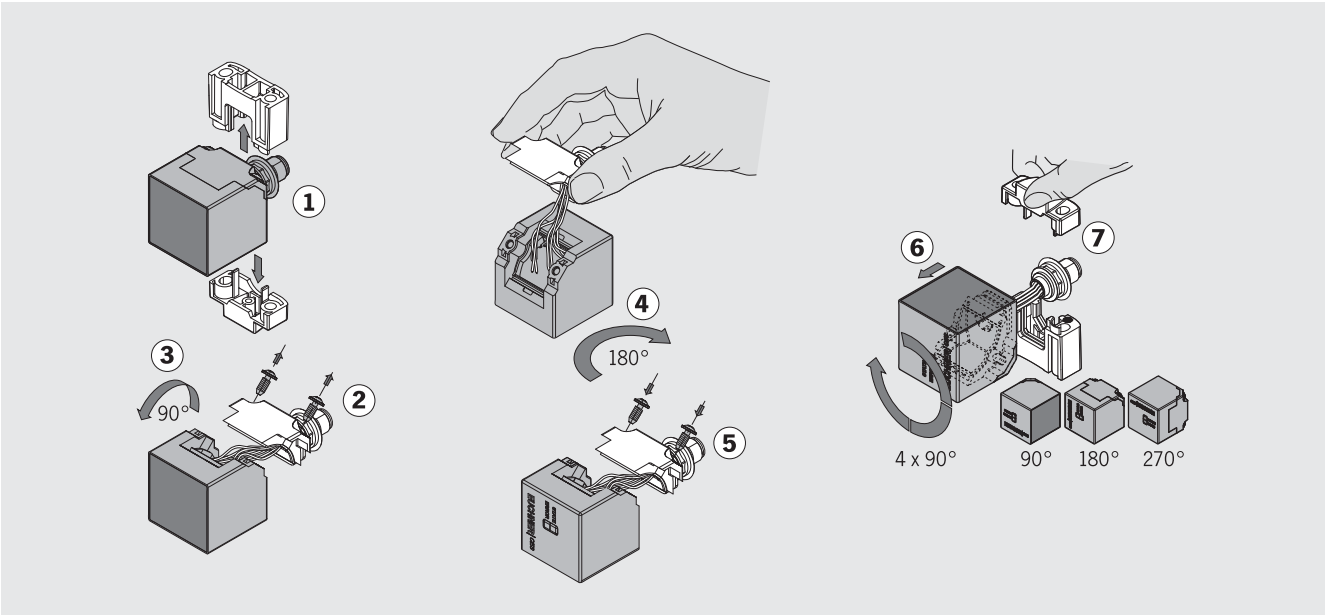
LED	Color	State	Significance
STATE	green	illuminated	Normal operation
		flashing	- Teach-in operation or Power Up - Actuator in limit range (V. 1.1.2 or higher) (refer to the status table for further signal functions)
DIA	red	illuminated	- Internal electronics fault - Fault at the inputs/outputs

LED displays CET-AR

LED	Color	State	Significance
STATE	green	illuminated	Normal operation
		flashing	Teach-in operation or Power Up (for further signal function see status table)
DIA	red	illuminated	- Internal electronics fault - Fault at the inputs/outputs
LED 1	red	freely configurable*	
LED 2	green	freely configurable*	

* Can vary depending on version. See data sheet.

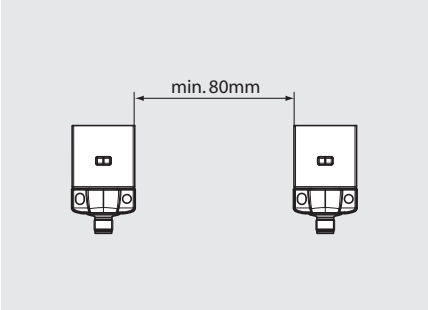
Changing the approach direction on CES-AR-C01

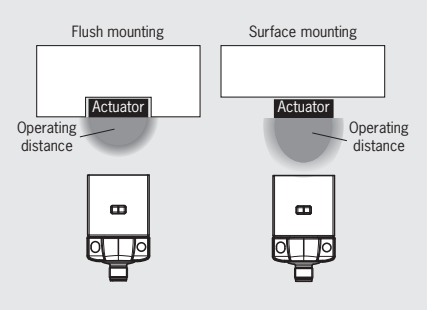


Mounting CES-AR-C01

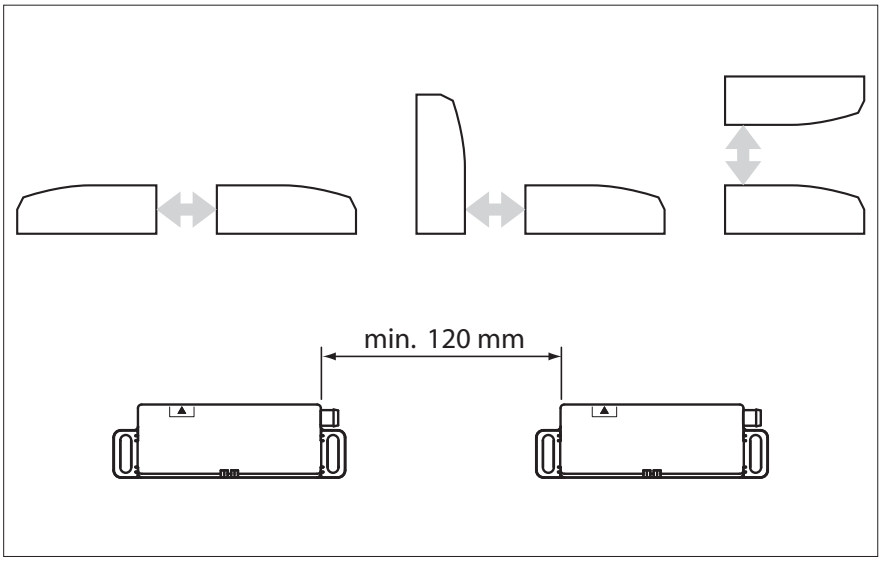
When mounting several safety switches, observe the stipulated minimum distance to avoid mutual interference.

distance changes as a function of the installation depth and the safety guard material.





Approach directions and minimum distance CES-AR-C.2



Safety switches

1...20
C01
Cat. 4 PLe

CES-AR-C01-.H-...
- One active face
- Approach direction adjustable
- Pulsing for short circuit detection
- Available in the unicode, multicode and fixcode variants

(see page 182)

1...20
C02
Cat. 4 PLe

CES-AR-C.2-.H-...
- Door hinged on right or left
- Two active faces
- Pulsing for short circuit detection
- Available in the unicode and multicode variants

(see page 188)

1...20
Cat. 4 PLe

CET.-AR-...-.H-...
- Guard locking with guard lock monitoring
- Pulsing for short circuit detection
- Available in the unicode and multicode variants

(see page 194)

Evaluation units

1...12
Cat. 4 PLe

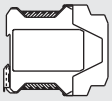
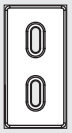
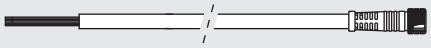
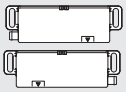
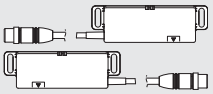
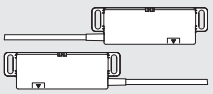
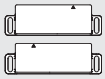
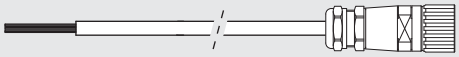
CES-AR-AES-12
- Central evaluation of an AR switch chain
- For switch chains of up to 12 devices

(see page 221)

Actuators

	**CES-A-BBA** ▸ Cube-shaped (see page 185)
	**CES-A-BCA** ▸ Cube-shaped (see page 185)
	**CES-A-BPA** ▸ Square (see page 186)
	**CES-A-BRN** ▸ Cube-shaped (see page 187)
	**CES-A-BLN-.2** ▸ Cube-shaped (see page 192)
	**CES-A-BLN-U2** ▸ Cube-shaped, compact (see page 192)
	**CES-A-BDN** ▸ Cylindrical design ∅ 6 mm (see page 193)
	**CET-A-BWK-50X** ▸ Locking force 6,500 N (see page 195)

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

<table>
<tr><th>Evaluation units</th><th>Connection cable</th><th>Safety switch</th><th>Actuator</th><th>Bolt</th></tr>
<tr><td rowspan="3">Optional
AR evaluation unit
 
page 221</td><td> 
page 205</td><td>CES-AR-C01-...
 
page 182</td><td>CES-A-BBA
 
page 185
CES-A-BCA
 
page 185
CES-A-BPA
 
page 186
CES-A-BRN
 
page 187</td><td rowspan="2">page
229 - 233</td></tr>
<tr><td> 
page 205
 
page 205</td><td>CES-AR-C.2...
 
 
 
page 188</td><td>CES-A-BLN-.2
 
page 192
CES-A-BLN-U2
 
page 192
CES-A-BDN
 
page 193</td><td>-</td></tr>
<tr><td> 
page 208
 
page 205</td><td>CET-AR-...
 
page 194</td><td>CET-A-BWK-50X
 
page 195</td><td>page
235</td></tr>
</table>

Possible combinations for CES components

To give you a quick overview of which CES components can be combined with each other, there is a combination 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

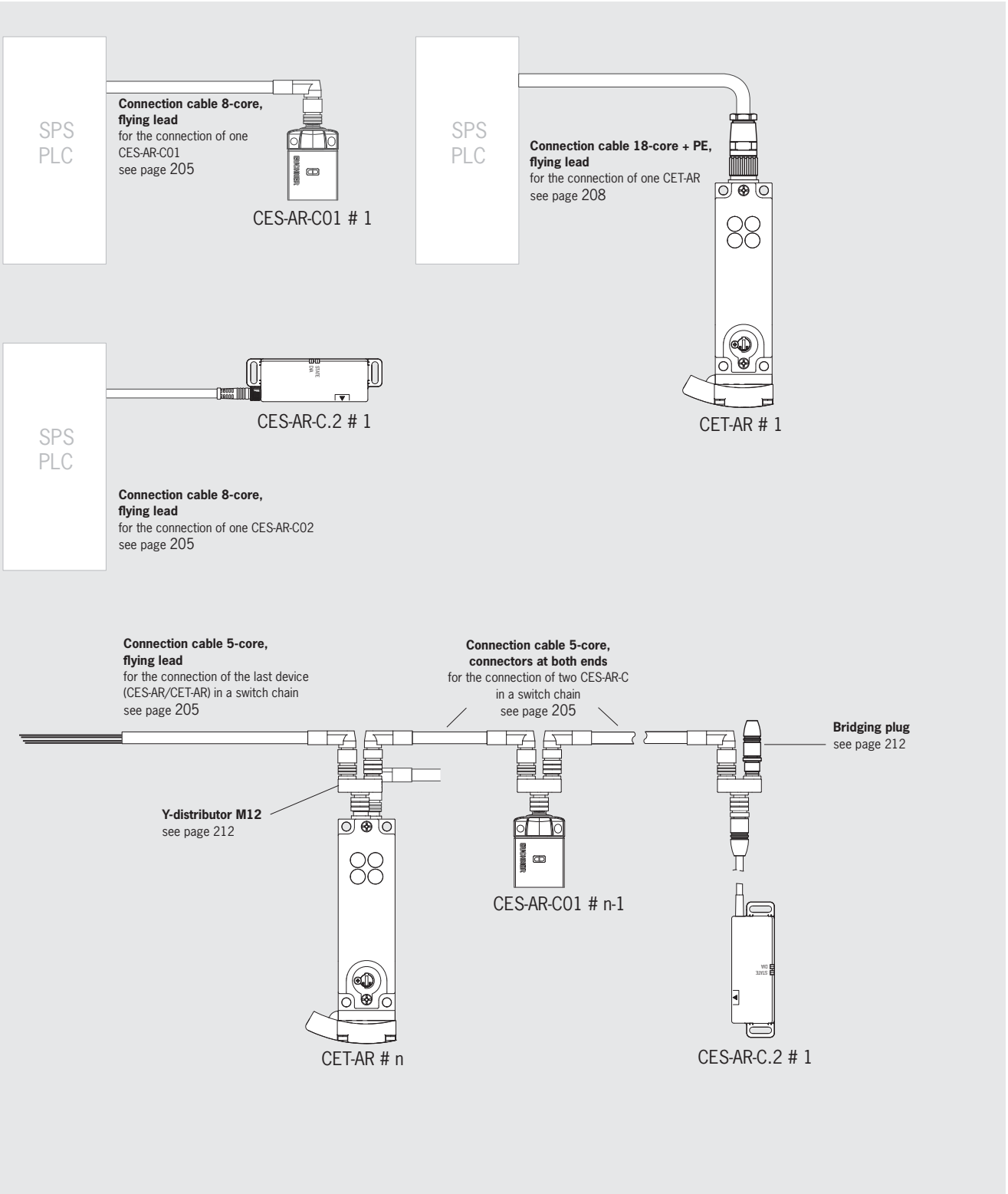
Non-contact safety switches CES-AR/CET-AR

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-O6-104730** 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...									

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

Evaluation unit	Safety switch
AR evaluation unit CES-AR-AES-12 098 225	**CES-AR-C01...** from V1.1.2 (see rating plate on the device)
	CES-AR-CR2... from V1.1.2 (see rating plate on the device)
	CES-AR-CL2... from V1.1.2 (see rating plate on the device)
	CET1/2-AR... from V1.1.2 (see rating plate on the device)
	CET3/4-AR... from V1.0.0 (see rating plate on the device)

Usage of the connection cables



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 according to EN ISO 13849-1**

For possible combinations see page 179

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.

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation
- Fixcode evaluation

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.

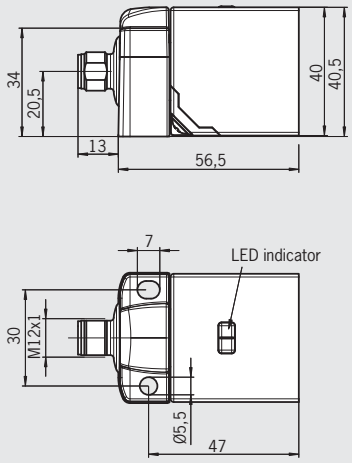
LED indicator
STATE Status LED
DIA Diagnostics LED

Additional connections
OUT Monitoring output (semiconductor)
RST Reset input

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

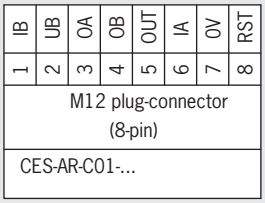
Cat. 4 / PLe | 1…20

Dimension drawing



For connection cable see page 205

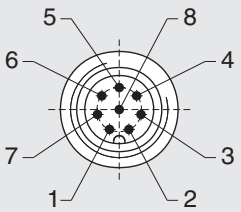
Block diagram



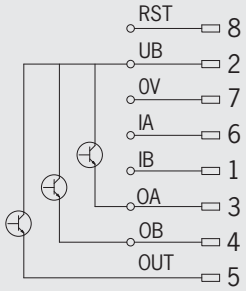
Connection examples see page 168

Terminal assignment

Pin	Designation	Description	Wire color as per 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	0V	Ground, DC 0 V	blue
8	RST	Reset input	red



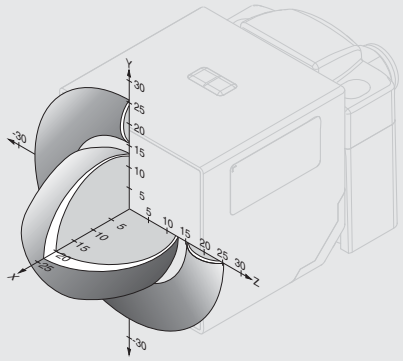
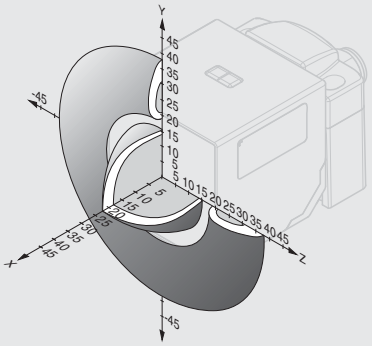
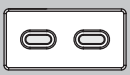
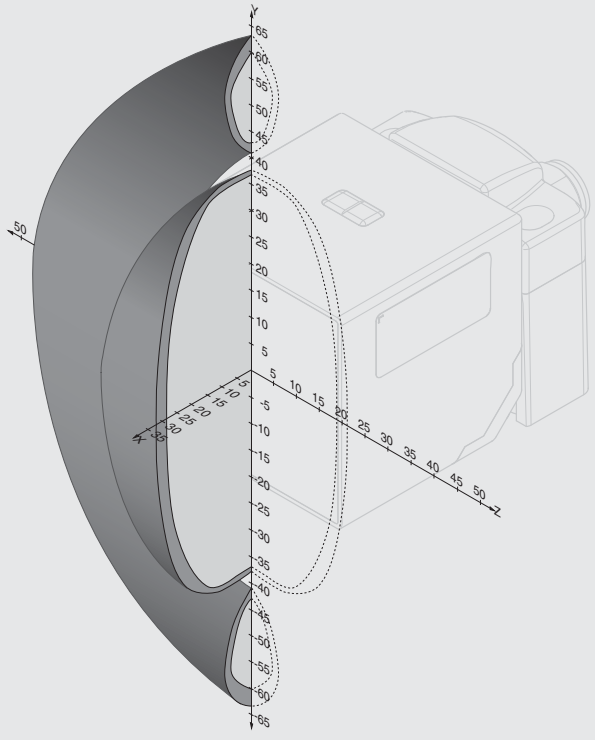
View on the connection side of the safety switch



Ordering table

Series	Category and PL acc. 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

Actuator	Safety switch CES-AR-C01-...
CES-A-BBA  page 185 **CES-A-BCA**  page 185	 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 186	 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-A-BRN  page 187	 For a side approach direction for the actuator and safety switch, a minimum distance of s = 12 mm must be maintained so that the operating distance of the side lobes is not entered.

Technical data for non-contact safety switches CES-AR-C01…

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		PBT V0 GF30		
Dimensions		according to EN 60947-5-2		mm
Mass		0.4		kg
Ambient temperature at U_B = DC 24 V	-20	-	+55	°C
Storage temperature	-25	-	+70	
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% (PELV)		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 cULus		DC 24 V, class 2		
External fuse (operating voltage U_B)	0.25	-	8	A
EMC protection requirements		according to EN 60947-5-3 and EN IEC 61326-3-1		
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 24V 400mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads		
Off-state current I_r		≤ 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 x 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	-	mm
- Assured switch-on distance s_{ao} [3]	15	-	-	
- 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]	-	mm
- Assured switch-on distance s_{ao}	18	-	-	
- 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]	-	mm
- Assured switch-on distance s_{ao}	20	-	-	
- 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 x 10^{-9} / h [6]		
Mission time		20		years

1) Values at a switching current of 50 mA without taking into account the cable length.
2) Tested by German Social Accident Insurance up to 75 V.
3) Values apply to surface installation 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 years), the German Social Accident Insurance certifies a PFH_d of 2.47 x 10^{-8}.

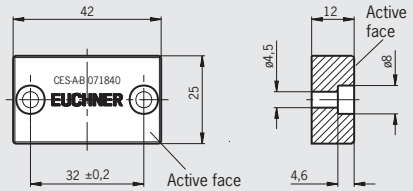
Actuator CES-A-BBA / CES-A-BCA

- **Cube-shaped design**
  42 x 25 mm

For possible combinations see page 179

Actuator CES-A-BBA

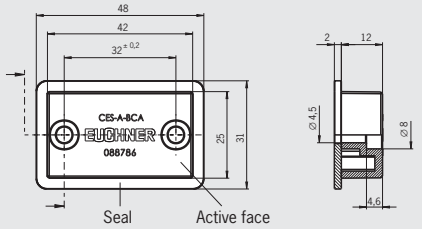
Dimension drawing



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 included	-	**071840** CES-A-BBA
CES-A-BCA	2 safety screws M4 x 14 included Flat seal included	Housing material PE-HD [1]	**088786** CES-A-BCA

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

Technical data

Parameter	Value min.	Value typ.	Value 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)		Fluoro rubber 75 FPM 4100		
Dimensions		42 x 25 x 12		mm
Mass		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		

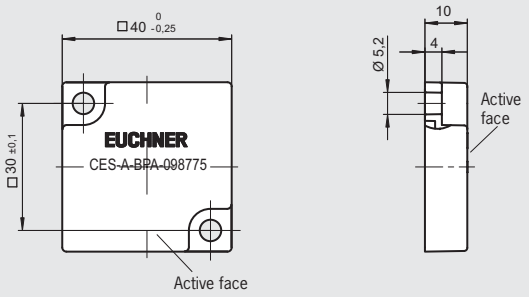
Actuator CES-A-BPA

- **Cube-shaped design**
  40 x 40 mm

For possible combinations see page 179

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 included	-	**098775** CES-A-BPA

Technical data

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

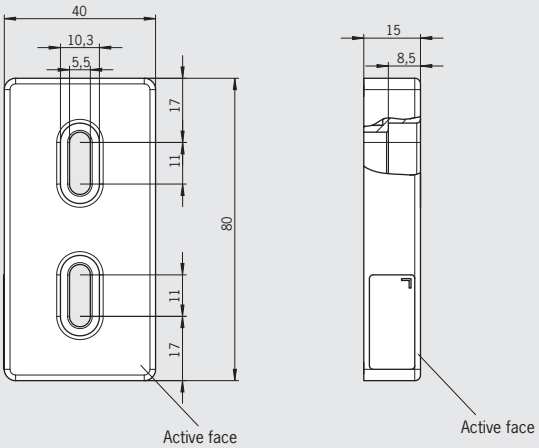
Actuator CES-A-BRN

- **Cube-shaped design**
  80 x 40 mm

For possible combinations see page 179

Actuator CES-A-BRN

Dimension drawing



2 safety screws
M5x16 included

Ordering table

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

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		PPS		
Dimensions		80 x 40 x 15		mm
Mass		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 179

For ordering table see page 191.

Approach direction
For approach directions see illustration "Approach directions and minimum distance" on page 174.

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.

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

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

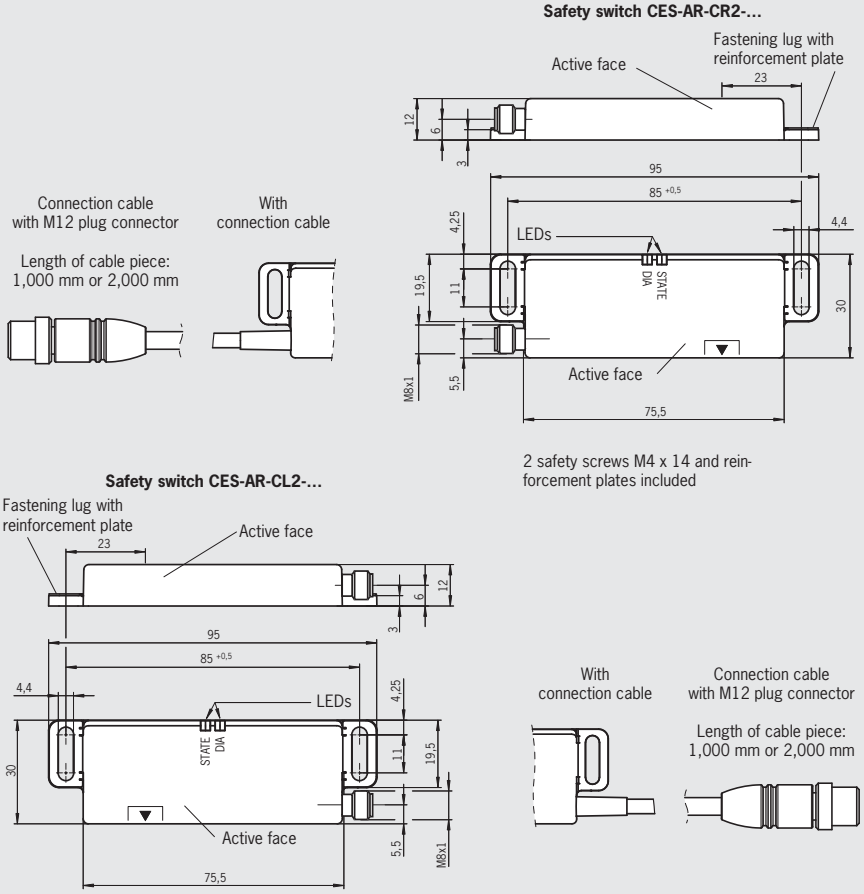
Important: To achieve the stated category in accordance with EN ISO 13849-1, both safety outputs (OA and OB) must be evaluated.

LED indicator
STATE Status LED
DIA Diagnostics LED

Additional connections
OUT Monitoring output (semiconductor)
RST Reset input

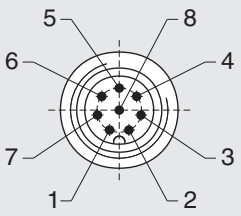
Non-contact safety switches CES-AR-C.2-... Cat. 4 PLe 1...20

Dimension drawing

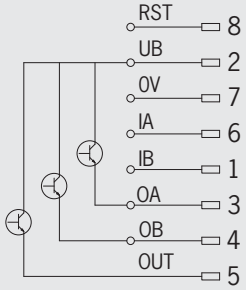


Terminal assignment

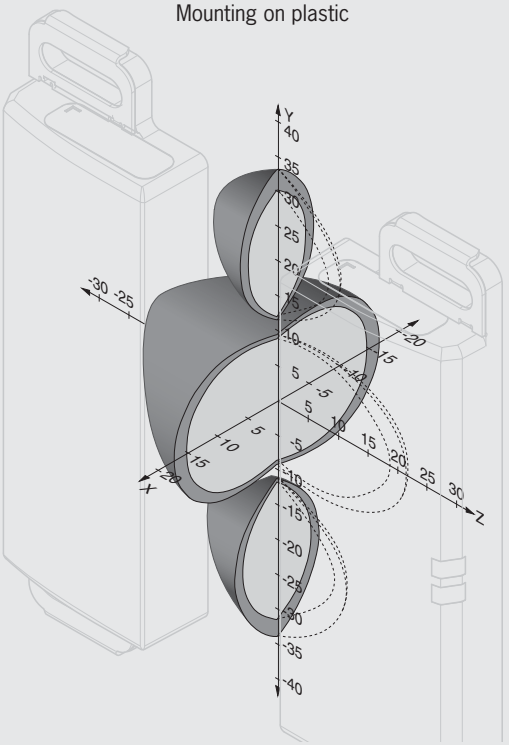
Pin	Designation	Description	Wire color as per DIN 47100
1	IB	Enable input for channel 2	white
2	UB	Power supply, DC 24 V	brown
3	OA	Safety output, channel 1	green
4	OB	Safety output, channel 2	yellow
5	OUT	Monitoring output	gray
6	IA	Enable input for channel 1	pink
7	0V	Ground, DC 0 V	blue
8	RST	Reset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



View on the connection side of the safety switch



Typical operating distances

Actuator	Safety switch CES-AR-C.2-...
CES-A-BLN... page 192 page 192	Mounting on plastic  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-A-BDN-06 page 193	Operating distance as for actuator CES-A-BLN... (see above)

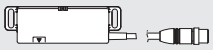
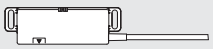
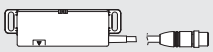
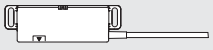
Attention:
The operating distance may vary depending on the substrate material and installation situation.

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

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	PBT V0 GF30			
Dimensions	95 x 30 x 12			mm
Mass	0.04			kg
Ambient temperature at U_B = DC 24 V	-30	-	+65	°C
Storage temperature	-40	-	+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% (PELV)			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 cULus	DC 24 V, class 2			
External fuse (operating voltage U_B)	0.25	-	1.5	A
EMC protection requirements	acc. to EN IEC 60947-5-3			
Safety outputs OA/OB	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)				
LOW U(OA)/U(OB)	0	-	1	
Switching current per safety output	1	-	200	mA
Utilization category according to EN 60947-5-2	DC-13 24 V 200 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads			
Off-state current I_r	≤ 0.25			mA
Monitoring output OUT	p-switching, short circuit-proof			
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	50	mA
Rated insulation voltage U_i	-	-	75	V
Rated impulse withstand voltage U_{imp}	-	-	1.5	kV
Resilience to vibration	acc. to EN IEC 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				
- Switch-on distance	-	15	-	mm
- 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-BDN [2]				
Operating distance for center offset m = 0				
- Switch-on distance	-	19	-	mm
- 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 x 10^{-9} / h [3]			
Mission time	20			years

1) Values at a switching current of 50 mA without taking into account the cable length.
2) The operating distance may vary depending on the substrate 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 German Social Accident Insurance certifies a PFH_d of 2.47 x 10^{-8}.

Ordering table

Series		Version	Order no./ item
Safety switches **CES-AR-C.2-AH-...** Unicode		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 mm², length 5 m	**109046** CES-AR-CR2-AH-L05-109046
		Door hinge left, connection cable PUR, 8 x 0.14 mm², length 5 m	**109047** CES-AR-CL2-AH-L05-109047
		Door hinge right, connection cable PUR, 8 x 0.14 mm², length 10 m	**109050** CES-AR-CR2-AH-L10-109050
		Door hinge left, connection cable PUR, 8 x 0.14 mm², length 10 m	**109051** CES-AR-CL2-AH-L10-109051
		Door hinge right, connection cable PUR, 8 x 0.14 mm², length 20 m	**109054** CES-AR-CR2-AH-L20-109054
		Door hinge left, connection cable PUR, 8 x 0.14 mm², length 20 m	**109055** CES-AR-CL2-AH-L20-109055
Safety switches **CES-AR-C.2-CH-...** Multicode		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 0.15 m, with plug connector M12, 8-pin	**115792** CES-AR-CR2-CH-SA-115792
		Door hinge left, connection cable PUR, length 0.15 m, with plug connector M12, 8-pin	**115793** CES-AR-CL2-CH-SA-115793
		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 PVC, length 2 m, with plug connector M12, 8-pin	**112928** CES-AR-CR2-CH-SA-112928
		Door hinge left, connection cable PVC, length 2 m, with plug connector M12, 8-pin	**112929** CES-AR-CL2-CH-SA-112929
		Door hinge right, connection cable PUR, 8 x 0.14 mm², length 5 m	**109044** CES-AR-CR2-CH-L05-109044
		Door hinge left, connection cable PUR, 8 x 0.14 mm², length 5 m	**109045** CES-AR-CL2-CH-L05-109045
		Door hinge right, connection cable PUR, 8 x 0.14 mm², length 10 m	**109048** CES-AR-CR2-CH-L10-109048
		Door hinge left, connection cable PUR, 8 x 0.14 mm², length 10 m	**109049** CES-AR-CL2-CH-L10-109049
		Door hinge right, connection cable PUR, 8 x 0.14 mm², length 20 m	**109052** CES-AR-CR2-CH-L20-109052
		Door hinge left, connection cable PUR, 8 x 0.14 mm², length 20 m	**109053** CES-AR-CL2-CH-L20-109053

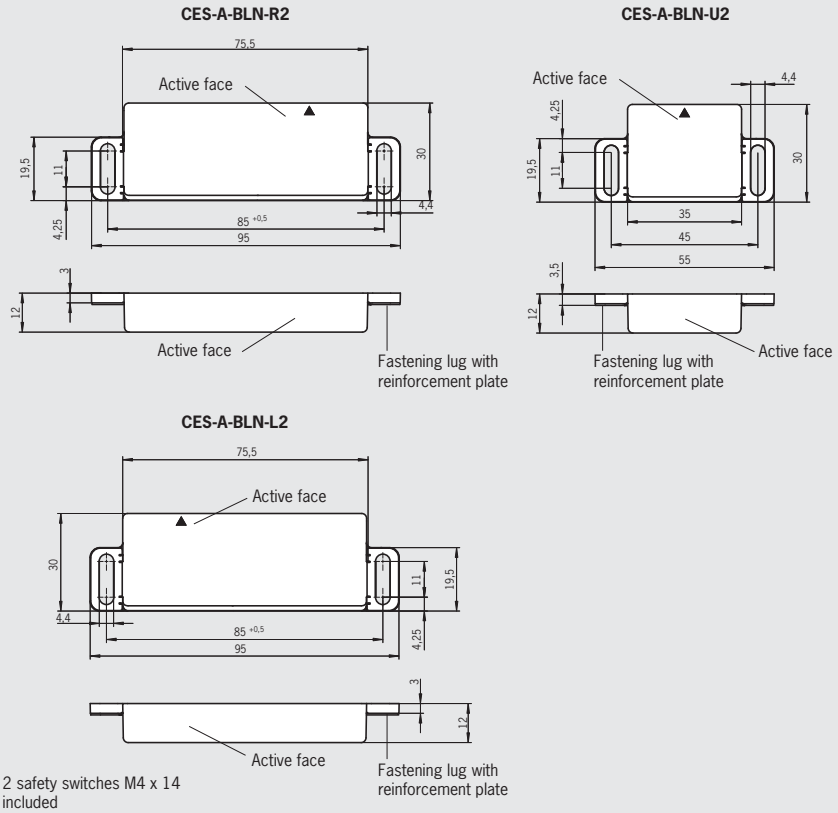
Actuator CES-A-BLN...

- **Cube-shaped design 55 x 30 mm and 95 x 30 mm**

For possible combinations see page 179

Actuator CES-A-BLN...

Dimension drawing



2 safety switches M4 x 14 included

Ordering table

Series	Comment	Version	Order no. Item
Actuator CES-A-BLN...	2 safety switches 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	Value min.	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
Mass - 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 acc. to EN 60529		IP67 / IP69K		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

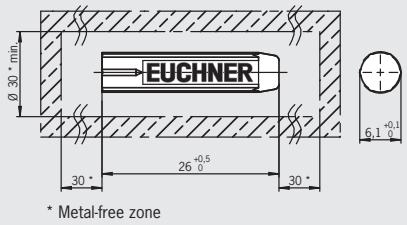
Actuator CES-A-BDN-06

- **Cylindrical design ∅ 6 mm**

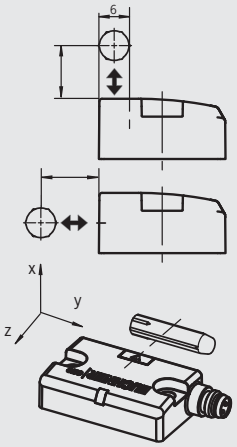
For possible combinations see page 179

Actuator CES-A-BDN-06

Dimension drawing



Installation options



Ordering table

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

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Macromelt PA-based plastic		
Dimensions		26 x ∅ 6		mm
Mass		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

Non-contact safety switches CET-AR-... with guard locking and guard lock monitoring

- **Safety switch with guard locking and integrated evaluation electronics**
- **Locking force up to 6,500 N**
- **Up to 20 switches in series**
- **Short circuit monitoring**
- **2 safety outputs (semiconductor outputs)**
- **Up to category 4 / PL e according to EN ISO 13849-1**

For possible combinations see page 179

For ordering table see page 200/201/203.

Approach direction

Horizontal
Can be adjusted in 90° steps

Safety switch
The safety switch CET is only allowed to be operated in conjunction with the actuator CET-A-BWK-50X.
Important: The actuator must be ordered separately (see page 218).

Available coding options (see page 5)
- Unicode evaluation
- Multicode evaluation

Mechanical release
Is used for releasing the guard locking with the aid of a tool. The mechanical release must be sealed to prevent tampering (for example with sealing lacquer).

Escape release (optional)
Is used for the manual release of the guard locking from within the danger area without tools.

Wire front release (optional)
The wire front release permits remote release of the guard locking via a pull rope. Flexible routing of the pull wire permits release of the guard locking in inaccessible installation situations.
The handle for the wire front release is not included. Please order separately (see page 174).

Lockout mechanism
The lockout mechanism can be used to prevent maintenance personnel from being unintentionally locked in the danger area, for example. In locked position, the lockout mechanism prevents activation of guard locking. The lockout mechanism can be secured in locking position with up to three locks. The mechanical release can still be used.

Feedback loop
Versions with feedback loop permit monitoring of connected devices (e.g. contactors). Additionally, a start button can be integrated (see wiring diagrams on pages "Wiring diagrams" on page 197 ff.).

Solenoid operating voltage

DC	24 V	+10%, -15%

Guard locking types
- **CET1** Guard locking by spring force
  Release by applying voltage to the guard locking solenoid.
- **CET2** Guard locking by solenoid force
  Guard locking by applying voltage to the guard locking solenoid.
  Release by spring force.
- **CET3** Function as for CET1-AR, but here the door position is also monitored. The door monitoring output OUT D is set to HIGH as soon as the actuator protrudes beyond the extended lift tappet (state: door closed, guard locking not active). The output OUT D remains set also with guard locking active.
- **CET4** Function as for CET2-AR, but here the door position is also monitored. The door monitoring output OUT D is set to HIGH as soon as the actuator protrudes beyond the extended lift tappet (state: door closed, guard locking not active). The output OUT D remains set also with guard locking active.

LED function display
- **LED State** Status LED
- **LED DIA** Diagnostics LED
- **LED 1 red** see wiring diagram
- **LED 2 green** see wiring diagram

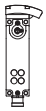
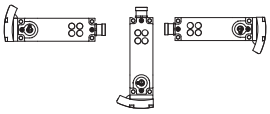
Additional connections

OUT	Monitoring output (semiconductor)
OUT D	Door monitoring output (only CET3/4)
RST	Reset input

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.

The category is dependent on the installation position of the safety switch:

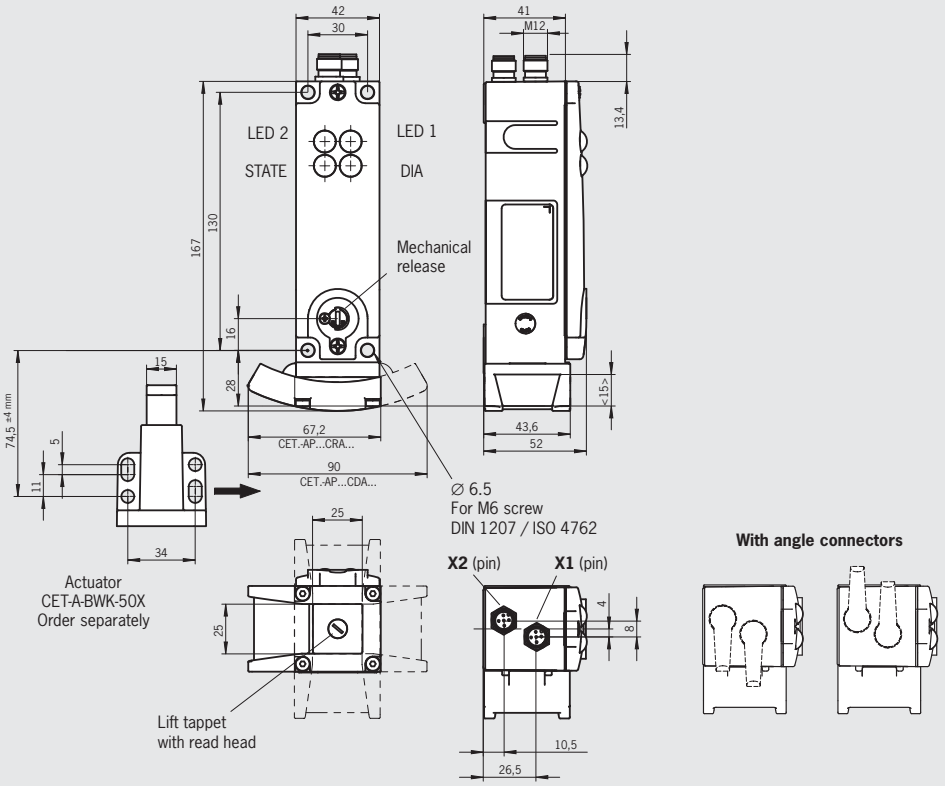
Installation position	Achievable category and PL according to EN ISO 13849-1
Head upward 	3 / PL e
Head downward or horizontal 	4 / PL e

1) 2)

Non-contact safety switches CET-AR...
with 2 plug connectors M12

Cat. 4 PLe 1...20

Dimension drawing



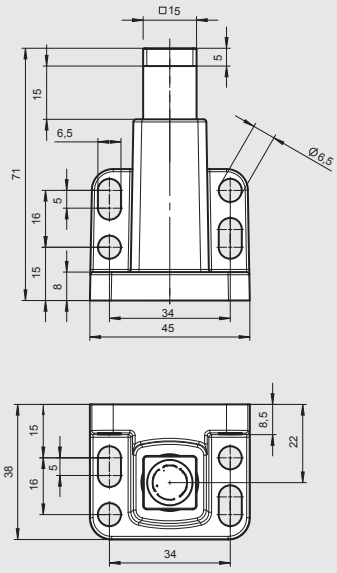
For connection cable see page 155

Actuator CET-A-BWK-50X
for safety switch CET-AR

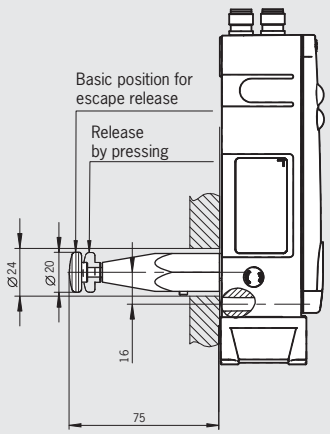
Safety switch CET-AR...
with escape release

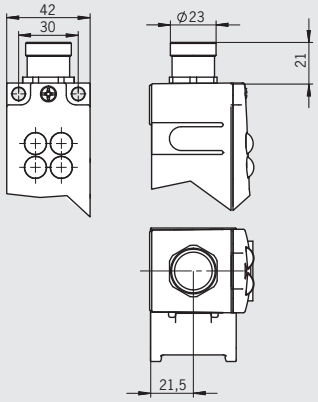
Safety switch CET-AR...
with plug connector RC18

Dimension drawing



4 safety screws
M5x16 included

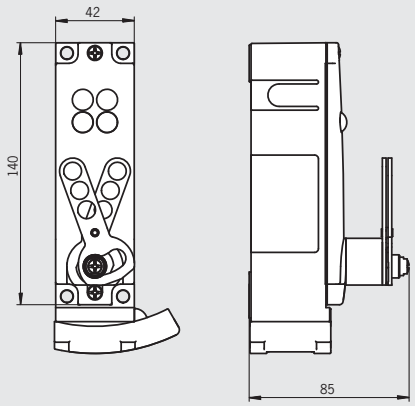




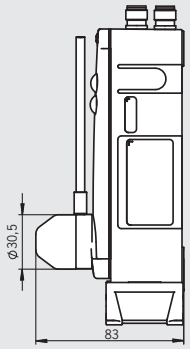
1) German Social Accident Insurance approval pending
2) No UL approval for version with plug connector RC18

Non-contact safety switches CET-AR...
with lockout mechanism

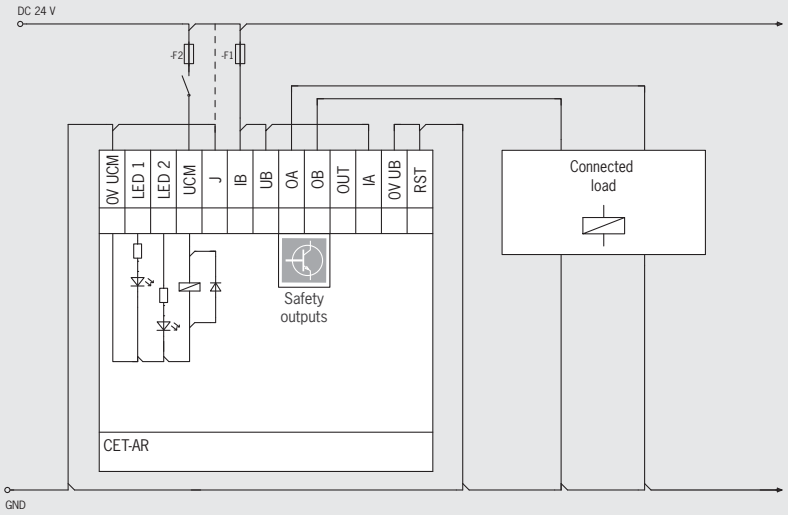
Dimension drawing



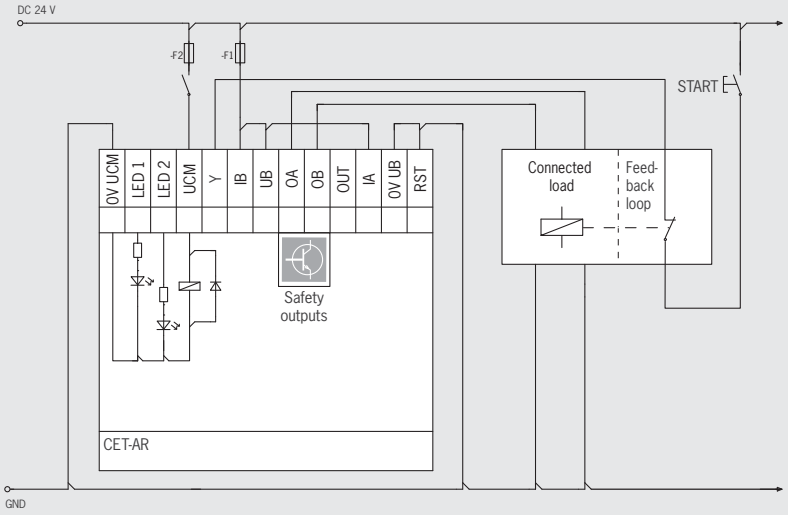
Non-contact safety switches CET-AR...
with wire front release



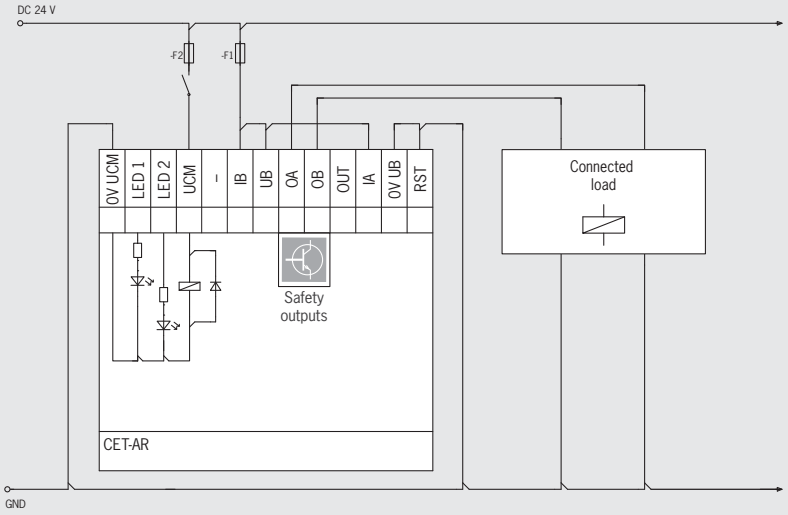
Wiring diagrams



Connection example for separate operation, version with teach-in input



Connection example for separate operation, version with start button and feedback loop

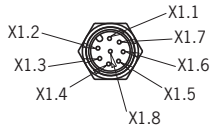
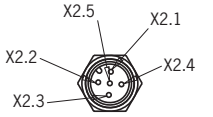


Connection example for separate operation, version without feedback loop and without teach-in input

Safety switch CET.-AR-...-SG-... with 2 plug connectors M12

Terminal assignment for version without door monitoring output (CET1/2)

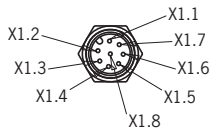
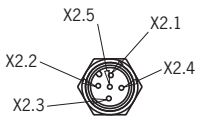
Wiring diagram A

Plug connector (view of connection side)	Pin	Designation	Function	Wire color of connection cable [1]
2 x M12   	X 1.1	IB	Enable input for channel 2	WH
	X 1.2	U_B	Operating voltage of AR electronics, 24 V DC	BN
	X 1.3	OA	Safety output, channel 1	GN
	X 1.4	OB	Safety output, channel 2	YE
	X 1.5	OUT	Monitoring output	GY
	X 1.6	IA	Enable input for channel 1	PK
	X 1.7	0 V U_B	Operating voltage of AR electronics 0 V	BU
	X 1.8	RST	Reset input	RD
	X 2.1	0 V U_{CM}	Operating voltage of guard locking solenoid 0 V	BN
	X 2.2	LED 1	LED 1 red, freely configurable, 24 V DC	WH
	X 2.3	LED 2	LED 2 green, freely configurable, 24 V DC	BU
	X 2.4	U_{CM}	Operating voltage of guard locking solenoid, 24 V DC	BK
	X 2.5	J	Version with teach-in input: To teach-in a new actuator, connect to 24 V DC; in normal operation connect to 0 V.	GY
		Y	Version with feedback loop: If the feedback loop is not used, connect to 24 V DC	
		-	Version without feedback loop and without teach-in input: This connection must be connected to 0 V.	

1) Only for standard EUCHNER connection cable

Terminal assignment for version with function earth connection (CET1/2)

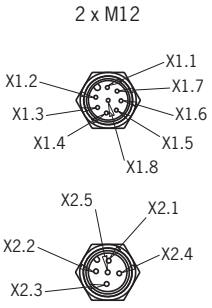
Wiring diagram B

Plug connector (view of connection side)	Pin	Designation	Function	Wire color of connection cable [1]
2 x M12   	X 1.1	IB	Enable input for channel 2	WH
	X 1.2	U_B	Operating voltage of AR electronics, 24 V DC	BN
	X 1.3	OA	Safety output, channel 1	GN
	X 1.4	OB	Safety output, channel 2	YE
	X 1.5	OUT	Monitoring output	GY
	X 1.6	IA	Enable input for channel 1	PK
	X 1.7	0 V U_B	Operating voltage of AR electronics 0 V	BU
	X 1.8	RST	Reset input	RD
	X 2.1	0 V U_{CM}	Operating voltage of guard locking solenoid 0 V	BN
	X 2.2	LED 1	LED 1 red, solenoid energized	WH
	X 2.3	LED 2	LED 2 green, freely configurable, 24 V DC	BU
	X 2.4	U_{CM}	Operating voltage of guard locking solenoid, 24 V DC	BK
	X 2.5	FE	Function earth	GY

1) Only for standard EUCHNER connection cable

Terminal assignment for version with door monitoring output (CET3/4), continued

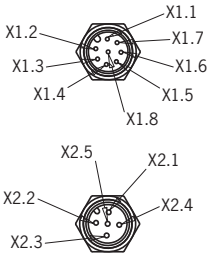
Wiring diagram C

Plug connector (view of connection side)	Pin	Designation	Function	Wire color of connection cable [1]
	X 1.1	IB	Enable input for channel 2	WH
	X 1.2	U_B	Operating voltage of AR electronics, 24 V DC	BN
	X 1.3	OA	Safety output, channel 1	GN
	X 1.4	OB	Safety output, channel 2	YE
	X 1.5	OUT	Monitoring output	GY
	X 1.6	IA	Enable input for channel 1	PK
	X 1.7	0 V U_B	Operating voltage of AR electronics 0 V	BU
	X 1.8	RST	Reset input	RD
	X 2.1	0 V U_{CM}	Operating voltage of guard locking solenoid 0 V	BN
	X 2.2	OUT D	Door monitoring output	WH
	X 2.3	LED 1	LED 1 red, freely configurable, 24 V DC	BU
	X 2.4	U_{CM}	Operating voltage of guard locking solenoid, 24 V DC	BK
	X 2.5	J	Version with teach-in input: To teach-in a new actuator, connect to 24 V DC; in normal operation connect to 0 V.	GY
		Y	Version with feedback loop: If the feedback loop is not used, connect to 24 V DC	
		-	Version without feedback loop and without teach-in input: This connection must be connected to 0 V.	

1) Only for standard EUCHNER connection cable

Terminal assignment for version with door monitoring output (CET3/4)

Wiring diagram D

Plug connector (view of connection side)	Pin	Designation	Function	Wire color of connection cable [1]
	X 1.1	IB	Enable input for channel 2	WH
	X 1.2	U_B	Operating voltage of AR electronics, 24 V DC	BN
	X 1.3	OA	Safety output, channel 1	GN
	X 1.4	OB	Safety output, channel 2	YE
	X 1.5	OUT	Monitoring output	GY
	X 1.6	IA	Enable input for channel 1	PK
	X 1.7	0 V U_B	Operating voltage of AR electronics 0 V	BU
	X 1.8	RST	Reset input	RD
	X 2.1	0 V U_{CM}	Operating voltage of guard locking solenoid 0 V	BN
	X 2.2	OUT D	Door monitoring output	WH
	X 2.3	OUT	Monitoring output	BU
	X 2.4	U_{CM}	Operating voltage of guard locking solenoid, 24 V DC	BK
	X 2.5	-	Not used	

1) Only for standard EUCHNER connection cable

Ordering table CET.-AR-...-SG-... with 2 plug connectors M12

Order no./item	Closed-circuit current principle	Open-circuit current principle	Door monitoring output	Unicode	Multicode	Single ramp	Double ramp	Teach-in input	Feedback loop	Escape release	Wire front release (L1 *)	Lockout mechanism	Wiring diagram
CET1													
106275 CET1-AR-CDA-AH-50X-SG-106275	●			●			●	●					A
106616 CET1-AR-CRA-AH-50A-SG-106616	●			●		●			●	75 mm			A
106159 CET1-AR-CRA-AH-50F-SG-106159	●			●		●		●		75 mm			A
111766 CET1-AR-CRA-AH-50F-SG-C2333-111766	●			●		●		●		75 mm		●	A
105802 CET1-AR-CRA-AH-50S-SG-105802	●			●		●			●				A
103418 CET1-AR-CRA-AH-50X-SG-103418	●			●		●		●					A
112121 CET1-AR-CRA-AH-50X-SG-C2333-112121	●			●		●		●				●	A
113320 CET1-AR-CRA-AH-50S-SG-C2290-113320	●			●		●			●		5 m		A
110241 CET1-AR-CRA-CH-50F-SG-110241	●				●	●				75 mm			A
105764 CET1-AR-CRA-CH-50S-SG-105764	●				●	●			●				A
105763 CET1-AR-CRA-CH-50X-SG-105763	●				●	●							A
109231 CET1-AR-CDA-CH-50X-SG-109231	●				●		●						A
113272 CET1-AR-CRA-CH-50F-SG-C2333-113272	●				●	●				75 mm		●	A
CET2													
109075 CET2-AR-CRA-AH-50S-SG-109075		●		●		●			●				A
110240 CET2-AR-CRA-AH-50X-SG-110240		●		●		●		●					A
109941 CET2-AR-CRA-CH-50F-SG-C2312-109941		●			●	●				105 mm			A
110082 CET2-AR-CRA-CH-50X-SG-110082		●			●	●							A

* L1 = hose length; cable length = L1 + 1 m. Important: Handle must be ordered separately (see page 218).

Ordering table CET.-AR-...-SG-... with 2 plug connectors M12 and function earth connection

Order no./item	Closed-circuit current principle	Open-circuit current principle	Door monitoring output	Unicode	Multicode	Single ramp	Double ramp	Teach-in input	Feedback loop	Escape release	Wire front release (L1 *)	Lockout mechanism	Wiring diagram
CET1													
109015 CET1-AR-CRA-CH-50X-SG-C2290-109015	●				●	●					3 m		B

* L1 = hose length; cable length = L1 + 1 m. Important: Handle must be ordered separately (see page 218).

Ordering table CET.-AR-...-SG-... with 2 plug connectors M12 (continued)

Order no./item	Closed-circuit current principle	Open-circuit current principle	Door monitoring output	Unicode	Multicode	Single ramp	Double ramp	Teach-in input	Feedback loop	Escape release	Wire front release (L1 *)	Lockout mechanism	Wiring diagram
CET3													
109401 CET3-AR-CRA-AH-50X-SG-109401	●		●	●		●		●					C
113139 CET3-AR-CRA-AH-50X-SG-C2290-113139	●		●	●		●		●			3 m		C
114512 CET3-AR-CRA-AH-50X-SG-C2333-114512	●		●	●		●		●				●	C
113965 CET3-AR-CRA-AH-50F-SG-113965	●		●	●		●		●		75 mm			C
114508 CET3-AR-CRA-AH-50F-SG-C2333-114508	●		●	●		●		●		75 mm		●	C
110114 CET3-AR-CRA-CH-50X-SG-C2290-110114	●		●		●	●					3 m		C
110905 CET3-AR-CRA-CH-50F-SG-C2290-110905	●		●		●	●				75 mm	3 m		C
110906 CET3-AR-CRA-CH-50X-SG-110906	●		●		●	●							C
110907 CET3-AR-CRA-CH-50F-SG-110907	●		●		●	●				75 mm			C
112921 CET3-AR-CRA-CH-50F-SG-C2333-112921	●		●		●	●				75 mm		●	C
112992 CET3-AR-CRA-CH-50S-SG-112992	●		●		●	●			●				C
113958 CET3-AR-CRA-CH-50F-SG-C2357-113958	●		●		●	●				105 mm		●	C
114090 CET3-AR-CDA-CH-50F-SG-114090	●		●		●		●						C
CET4													
111683 CET4-AR-CRA-AH-50X-SG-111683		●	●	●		●		●					C
111684 CET4-AR-CRA-CH-50X-SG-111684		●	●		●	●							C
113767 CET4-AR-CRA-CH-50X-SG-C2333-113767		●	●		●	●						●	C
114650 CET4-AR-CRA-CH-50F-SG-114650		●	●		●	●				75 mm			C
113081 CET4-AR-CRA-CH-50S-SG-113081		●	●		●	●			●				C
114712 CET4-AR-CDA-CH-50X-SG-114712		●	●		●		●						C
113609 CET4-AR-CRA-CH-50X-SG-C2355-113609		●	●		●	●							D

* L1 = hose length; cable length = L1 + 1 m. Important: Handle must be ordered separately (see page 218).

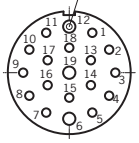
Safety switch CET.-AR-...-SH-... with plug connector RC18 (no UL approval)

Terminal assignment

Wiring diagram E

RC18

With screen bonding clamp



Plug connector (view of connection side)	Pin	Designation	Function	Wire color of connection cable [1]
	1	U_{CM}	Operating voltage of guard locking solenoid, 24 V DC	VT
	2	IA	Enable input for channel 1	RD
	3	IB	Enable input for channel 2	GY
	4	OA	Safety output, channel 1	RD/BU
	5	OB	Safety output, channel 2	GN
	6	U_B	Operating voltage of AR electronics, 24 V DC	BU
	7	RST	Reset input	GY/PK
	8	OUT D	Door monitoring output (only CET3-AR and CET4-AR)	GN/WH
	9	-	n.c.	YE/WH
	10	OUT	Monitoring output	GY/WH
	11	-	n.c.	BK
	12	FE	Function earth	GN/YE
	13	J	Version with teach-in input: To teach-in a new actuator, connect to 24 V DC; in normal operation connect to 0 V.	PK
		Y	Version with feedback loop: If the feedback loop is not used, connect to 24 V DC	
		-	Version without feedback loop and without teach-in input: This connection must be connected to 0 V.	
	14	-	n.c.	BN/GY
	15	LED 1	LED 1 red, freely configurable, 24 V DC	BN/YE
	16	LED 2	LED 2 green, freely configurable, 24 V DC	BN/GN
	17	-	n.c.	WH
	18	0V U_{CM}	Operating voltage of guard locking solenoid 0 V	YE
	19	0V U_B	Operating voltage of AR electronics 0 V	BN

1) Only for standard EUCHNER connection cable

Ordering table CET.-AR-...-SH-... with plug connector RC18 (no UL approval)

Order no./item	Closed-circuit current principle	Open-circuit current principle	Door monitoring output	Unicode	Multicode	Single ramp	Double ramp	Teach-in input	Feedback loop	Escape release	Wire front release (L1 *)	Lockout mechanism	Wiring diagram
CET1													
110203 CET1-AR-CRA-AH-50X-SH-110203	●			●		●		●					E
113022 CET1-AR-CRA-AH-50X-SH-C2290-113022	●			●		●		●			3 m		E
113021 CET1-AR-CRA-AH-50F-SH-C2353-113021	●			●		●		●		105 mm	3 m		E
110943 CET1-AR-CRA-AH-50F-SH-C2312-110943	●			●		●		●		105 mm			E
110204 CET1-AR-CRA-CH-50X-SH-110204	●				●	●							E
113255 CET1-AR-CRA-CH-50X-SH-113255	●				●		●						E
CET2													
110205 CET2-AR-CRA-AH-50X-SH-110205		●		●		●		●					E
112466 CET2-AR-CDA-AH-50X-SH-112466		●		●			●	●					E
110206 CET2-AR-CRA-CH-50X-SH-110206		●			●	●							E
CET3													
110103 CET3-AR-CRA-AH-50X-SH-110103	●		●	●		●		●					E
111725 CET3-AR-CRA-AH-50F-SH-C2312-111725	●		●	●		●		●		105 mm			E
113024 CET3-AR-CRA-AH-50X-SH-C2290-113024	●		●	●		●		●			3 m		E
113023 CET3-AR-CRA-AH-50F-SH-C2353-113023	●		●	●		●		●		105 mm	3 m		E
113151 CET3-AR-CRA-AH-50X-SH-C2333-113151	●		●	●		●		●				●	E
114088 CET3-AR-CRA-AH-50X-SH-C2290-114088	●		●	●		●		●			5 m		E
114505 CET3-AR-CRA-AH-50F-SH-C2333-114505	●		●	●		●		●		75 mm		●	E
113148 CET3-AR-CRA-AH-50F-SH-113148	●		●	●		●		●		75 mm			E
114647 CET3-AR-CDA-AH-50F-SH-114647	●		●	●			●	●		75 mm			E
110104 CET3-AR-CRA-CH-50X-SH-110104	●		●		●	●							E
CET4													
110201 CET4-AR-CRA-AH-50X-SH-110201		●	●	●		●		●					E
110202 CET4-AR-CRA-CH-50X-SH-110202		●	●		●	●							E
116285 CET4-AR-CRA-AH-50F-SH-116285		●	●	●		●		●		75 mm			E

* L1 = hose length; cable length = L1 + 1 m. Important: Handle must be ordered separately (see page 218).

Technical data for non-contact safety switches CET-AR...

Safety switch

Parameter		Value min.	Value typ.	Value max.	Unit
General					
Material, ramp		Stainless steel			
Material, safety switch housing		Die-cast aluminum			
Installation position		Any (recommendation: switch head downward)			
Degree of protection	with plug connector M12	IP 67			
	with plug connector RC18	IP65 with plug connector RC 18			
		(screwed tight with the related mating connector)			
Safety class		III			
Degree of contamination		3			
Mechanical life		1 x 10^6 operating cycles			
Ambient temperature at U_B		-20	-	+55	°C
Actuator approach speed, max.		20			m/min
Locking force F_{max}		6,500			N
Locking force F_{Zh} in acc. with GS-ET-19		$F_{Zh} = F_{max}/1.3 = 5{,}000$			N
Mass		Approx. 1.0			kg
Degrees of freedom (actuator in recess) X, Y, Z		X, Y ± 5; Z ± 4			mm
Connection type (depending on version)		2 plug connectors M12, 5 and 8-pin 1 plug connector RC 18, 19-pin (as yet no UL approval)			
Operating voltage U_B (reverse-polarity protected, regulated, residual ripple < 5%)		24 ± 15% (PELV)			V DC
Current consumption I_B		80			mA
For the approval according to UL the following applies		Operation only with UL class 2 power supply, or equivalent measures			
Switching load according to UL		DC 24 V, class 2			
External fuse (operating voltage U_B)		0.25	-	2	A
External fuse (solenoid operating voltage U_{CM})		0.5	-	8	A
Rated insulation voltage U_i		-	-	75	V
Resilience to vibration		according to EN 60947-5-2			
EMC protection requirements		acc. to EN IEC 60947-5-3			
Safety outputs OA/OB		Semiconductor outputs, p-switching, short circuit-proof			
- Output voltage U_{OA}/U_{OB} [1] HIGH U_{OA}/U_{OB} LOW U_{OA}/U_{OB}		 U_B - 1.5 0	 - -	 U_B 1	V DC
Switching current per safety output		1	-	200	mA
Utilization category according to EN 60947-5-2		DC-13 24V 200mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads			
Switching frequency		0.5			Hz
Repeat accuracy R acc. to EN IEC 60947-5-3		≤ 10			%
Monitoring outputs OUT and OUT D (optional)		(p-switching, short circuit-proof)			
Output voltage		0.8 x U_B	-	U_B	V DC
Max. load		-	-	50	mA
Teach-in input J or input feedback loop Y					
HIGH		15	-	U_{CM}	V
LOW		0	-	1	
Solenoid					
Solenoid operating voltage U_{CM} (reverse polarity protected, regulated, residual ripple < 5%)		DC 24 V +10%/-15%			
Current consumption solenoid I_{CM}		480			mA
Power consumption		10			W
Duty cycle		100			%
Freely configurable LEDs [2]		**LED1 red, LED2 green**			
Operating voltage		20.4	-	26.4	V DC
Reliability values according to EN ISO 13849-1		**Head downward or horizontal**		**Head upward**	
Category		4		3	
Performance Level (PL)		e		e	
PFH_d		3.1 x 10^{-9} / h		4,29 x 10^{-8} / h	
Mission time		20		20	years

1) Values at a switching current of 50 mA without taking into account the cable lengths.
2) Can vary depending on version. See data sheet.

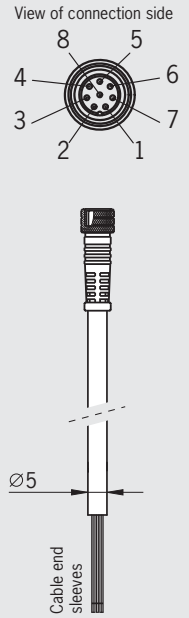
Actuator

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material	Stainless steel			
Installation position	Active face opposite read head			
Degree of protection according to IEC/EN 60529	IP67			
Mechanical life	1 x 10^6 operating cycles			
Ambient temperature	-20	-	+55	°C
Locking force, max. (locked)	6,500			N
Mass	Approx. 0.25			kg
Stroke max.	15			mm
Power supply	Inductive, via read head			

Connection cables with plug connectors

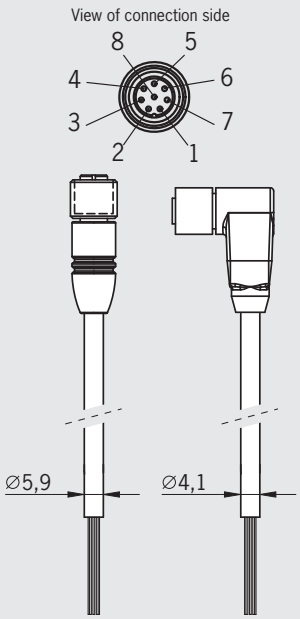
Flying lead
M8 female connector 8-pin

Dimension drawing



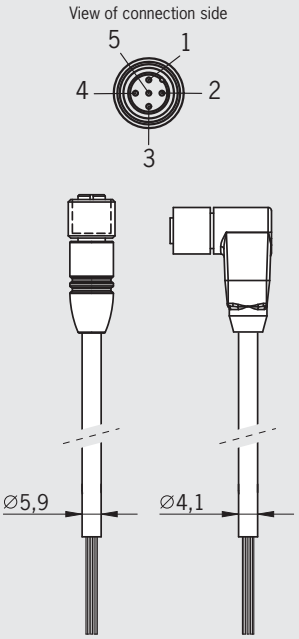
1 = WH	IB
2 = BN	UB
3 = GN	OA
4 = YE	OB
5 = GY	OUT
6 = PK	IA
7 = BU	0 V
8 = RD	RST

Flying lead
M12 female connector 8-pin



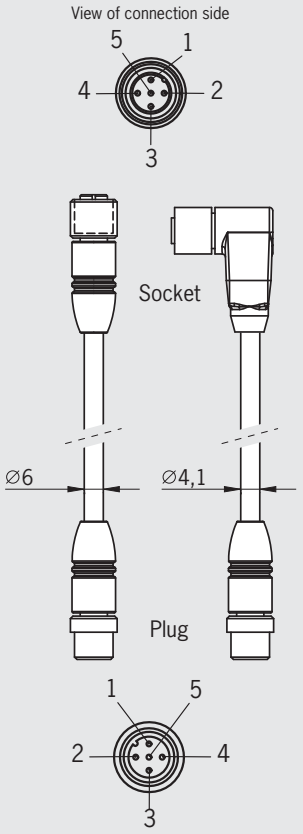
1 = WH	IB
2 = BN	UB
3 = GN	OA
4 = YE	OB
5 = GY	OUT
6 = PK	IA
7 = BU	0 V
8 = RD	RST

Flying lead
M12 female connector 5-pin



	CES-AR	CET-AR
1 = BN	U_B	0 V U_{CM}
2 = WH	OA	LED1/ OUT D
3 = BU	0 V	LED1/ LED2
4 = BK	OB	U_{CM}
5 = GY	RST	J/Y/n.c.

Plug on both ends
M12 plug and female connector 5-pin



	CES-AR	CET-AR
1 = BN	U_B	0 V U_{CM}
2 = WH	OA	LED1/ OUT D
3 = BU	0 V	LED1/ LED2
4 = BK	OB	U_{CM}
5 = GY	RST	J/Y/n.c.

Ordering table see next page.

Connection cables with plug connectors

Ordering table connection cables PVC with plug connectors

Series		Comment	Order no./item
M8 8 pin	**M8 connection cable PVC, 8-core, flying lead, 8 x 0.14 mm²** for the connection of one CES-AR-C.2-..-SG	M8 female connector 8-pin, length 5 m	**110933** C-M08F08-08X014PV05,0-ES-110933
		M8 female connector 8-pin, length 10 m	**110934** C-M08F08-08X014PV10,0-ES-110934
		M8 female connector 8-pin, length 15 m	**110935** C-M08F08-08X014PV15,0-ES-110935
		M8 female connector 8-pin, length 20 m	**111603** C-M08F08-08X014PV20,0-ES-111603
M12 5 pin	**M12 connection cable PVC, 5-core, flying lead, 5 x 0.34 mm²** for the connection of one CET.-AR	M12 female connector 5-pin, length 5 m	**100183** C-M12F05-05X034PV05,0-MA-100183
		M12 female connector 5-pin, length 10 m	**100184** C-M12F05-05X034PV10,0-MA-100184
		M12 female connector 5-pin, length 20 m	**100185** C-M12F05-05X034PV20,0-MA-100185
	M12 extension cable PVC, 5-core, plug connectors at both ends for the connection of one CET.-AR to decentralized peripheral equipment	M12 female connector 5-pin to M12 plug connector, length 5 m	**100180** C-M12F05-05X034PV05,0-M12M05-100180
		M12 female connector 5-pin to M12 plug connector, length 10 m	**100181** C-M12F05-05X034PV10,0-M12M05-100181
		M12 female connector 5-pin to M12 plug connector, length 20 m	**100182** C-M12F05-05X034PV20,0-M12M05-100182
M12 8 pin	**M12 connection cable PVC, 8-core, flying lead, 8 x 0.25 mm²** for the connection of one CES-AR-C01-..-SA / CES-AR-C.2-..-SA/ CET.-AR	M12 female connector 8-pin, length 5 m	**100177** C-M12F08-08X025PV05,0-MA-100177
		M12 female connector 8-pin, length 10 m	**100178** C-M12F08-08X025PV10,0-MA-100178
		M12 female connector 8-pin, length 20 m	**100179** C-M12F08-08X025PV20,0-MA-100179

Ordering table connection cables PUR with plug connectors

Series		Comment	Order no./item
M8 8 pin	**M8 connection cable PUR, 8-core, flying lead, 8 x 0.14 mm²** for the connection of one CES-AR-C.2-..-SG	M8 female connector 8-pin, length 5 m	**106671** C-M08F08-08X014PU05,0-ES-106671
		M8 female connector 8-pin, length 10 m	**106672** C-M08F08-08X014PU10,0-ES-106671
		M8 female connector 8-pin, length 20 m	**106673** C-M08F08-08X014PU20,0-ES-106673
M12 8 pin	**M12 connection cable PUR, 8-core, flying lead, 8 x 0.25 mm²** for the connection of one CES-AR-C01-..-SA / CES-AR-C.2-..-SA/ CET.-AR	M12 female connector, angled, 8-pin, length 10 m, cable outlet right	**113189** C-M12F08-08X025PU10,0-MA-113189
		M12 female connector, angled, 8-pin, length 10 m, cable outlet left	**113188** C-M12F08-08X025PU10,0-MA-113188
M12	**M12 connection cable PUR, 5-core, flying lead, 5 x 0.25 mm²** for the connection of one CET.-AR	M12 female connector, angled, 5-pin, length 10 m, cable outlet right	**113190** C-M12F05-05X025P10,0-MA-113190
		M12 female connector, angled, 5-pin, length 10 m, cable outlet left	**113187** C-M12F05-05X025P10,0-MA-113187
5 pin	**M12 extension cable PUR, 5-core, plug connectors at both ends** for the connection of one CET.-AR to decentralized peripheral equipment	M12 female connector, angled, 5-pin to M12 plug connector, length 10 m, cable outlet right	**115566** C-M12F05-05X025P10,0-M12M05-115566
		M12 female connector, angled, 5-pin to M12 plug connector, length 10 m, cable outlet left	**115565** C-M12F05-05X025P10,0-M12M05-115565

Technical data for M8 connection cable PVC, 8-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		8-pin M8 female connector, straight		
Connection		Screw terminal		
Conductor cross-section		8 x 0.14		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PVC ∅ 4.5		mm
Static bending radius		min. 5 x cable diameter		mm

Technical data for M8 connection cable PUR, 8-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		8-pin M8 female connector, straight		
Connection		Screw terminal		
Conductor cross-section		8 x 0.14		mm²
Material, connector housing		TPU		
Material, outer sheath		PUR ∅ 5		mm
Static bending radius		min. 5 x cable diameter		mm

Technical data for M12 connection cable PVC, 5-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		5-pin M12 female connector, straight		
Connection		Screw terminal		
Conductor cross-section		5 x 0.34		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PVC ∅ 5.9		mm
Static bending radius		min. 5 x cable diameter		mm

Technical data for M12 connection cable PVC, 8-core

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		8-pin M12 female connector, straight		
Connection		Screw terminal		
Conductor cross-section		8 x 0.25		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PVC ∅ 5.9		mm
Static bending radius		min. 5 x cable diameter		mm

Technical data for M12 connection cable PUR, 5-core, with female connector, angled

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		5-pin M12 female connector, angled		
Connection		Screw terminal		
Conductor cross-section		5 x 0.25		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PUR ∅ 4.1		mm
Static bending radius		min. 5 x cable diameter		mm

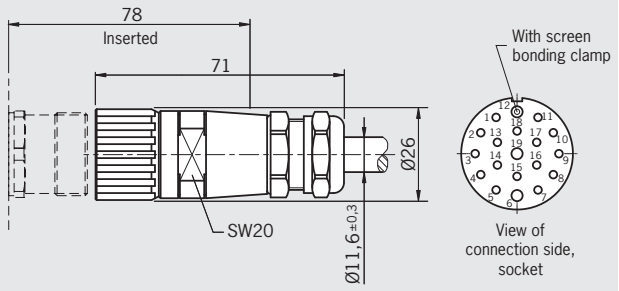
Technical data for M12 connection cable PUR, 8-core, with female connector, angled

Parameter	Value min.	Value typ.	Value max.	Unit
Plug connector		8-pin M12 female connector, angled		
Connection		Screw terminal		
Conductor cross-section		8 x 0.25		mm²
Material, connector housing		TPU, self-extinguishing		
Material, outer sheath		PUR ∅ 5.2		mm
Static bending radius		min. 5 x cable diameter		mm

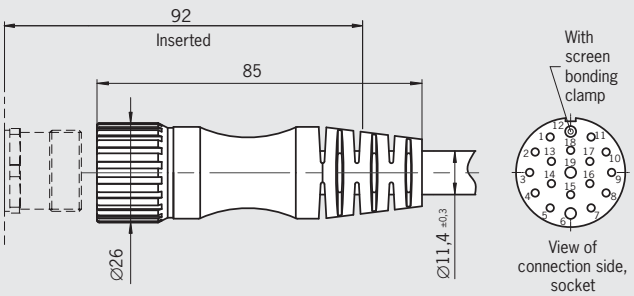
Connection cables with plug connector RC18 for CET-AR

Female connector RC18 with cable
18-pin + PE

Dimension drawing

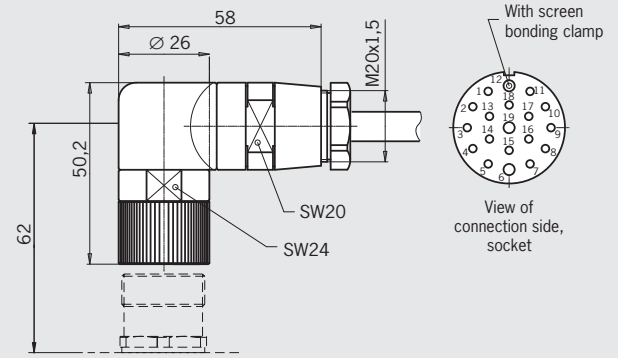


Female connector RC18 with cable halogen-free
18-pin + PE

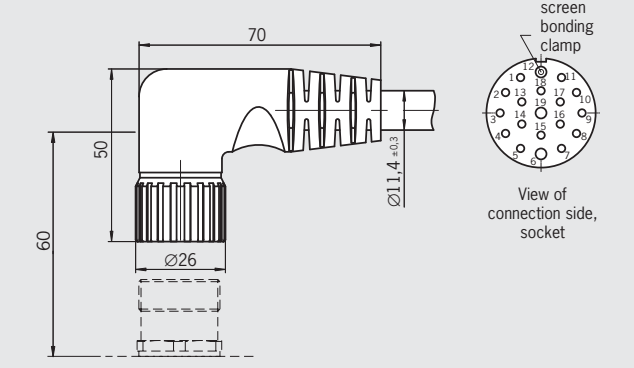


Female connector RC18 angled with cable
18-pin + PE

Dimension drawing



Female connector RC18 angled with cable halogen-free
18-pin + PE



Assignment connection cable RC18 for CET-AR

Pin	Core color	Conductor cross-section [mm]	Pin	Core color	Conductor cross-section [mm]
1	VT	0.5	11	BK	0.5
2	RD	0.5	12	GN/YE	1.0
3	GY	0.5	13	PK	0.5
4	RD/BU	0.5	14	BN/GY	0.5
5	GN	0.5	15	BN/YE	0.5
6	BU	1.0	16	BN/GN	0.5
7	GY/PK	0.5	17	WH	0.5
8	GN/WH	0.5	18	YE	0.5
9	YE/WH	0.5	19	BN	1.0
10	GY/WH	0.5			

Ordering table see next page.

Ordering table

Designation	Cable length [m]	Order no./item
Female connector RC18 with cable PUR for CET-AR 18-pin + PE	1.5	**092761** RC18EF1,5M-C1825
	3	**092816** RC18EF3M-C1825
	6	**077014** RC18EF6M-C1825
	8	**077015** RC18EF8M-C1825
	10	**092898** RC18EF10M-C1825
	15	**077016** RC18EF15M-C1825
	20	**092726** RC18EF20M-C1825
	25	**092727** RC18EF25M-C1825
	30	**095993** RC18EF30M-C1825
Female connector RC18 with cable PUR halogen-free, suitable for drag chain for CET-AR 18-pin + PE	1.5	**092883** RC18EF1,5MF-C1825
	3	**092884** RC18EF3MF-C1825
	6	**092885** RC18EF6MF-C1825
	8	**092886** RC18EF8MF-C1825
	10	**092887** RC18EF10MF-C1825
	15	**092888** RC18EF15MF-C1825
	20	**092889** RC18EF20MF-C1825
	25	**092890** RC18EF25MF-C1825
	30	**109681** RC18EF30MF-C1825

Designation	Cable length [m]	Order no./item	
		Cable outlet left	Cable outlet right
Female connector RC18 angled with cable PUR for CET-AR 18-pin + PE	1.5	**092906** RC18WF1,5ML-C1825	**092907** RC18WF1,5MR-C1825
	3	**092908** RC18WF3ML-C1825	**092909** RC18WF3MR-C1825
	6	**077018** RC18WF6ML-C1825	**085194** RC18WF6MR-C1825
	8	**077019** RC18WF8ML-C1825	**085195** RC18WF8MR-C1825
	10	**092901** RC18WF10ML-C1825	**092902** RC18WF10MR-C1825
	15	**077020** RC18WF15ML-C1825	**085196** RC18WF15MR-C1825
	20	**092910** RC18WF20ML-C1825	**092911** RC18WF20MR-C1825
	25	**092912** RC18WF25ML-C1825	**092913** RC18WF25MR-C1825
Female connector RC18 angled with cable PUR halogen-free, suitable for drag chain for CET-AR 18-pin + PE	1.5	**092891** RC18WF1,5MLF-C1825	**092892** RC18WF1,5MRF-C1825
	3	**092893** RC18WF3MLF-C1825	**092894** RC18WF3MRF-C1825
	6	**092697** RC18WF6MLF-C1825	**092698** RC18WF6MRF-C1825
	8	**092895** RC18WF8MLF-C1825	**092896** RC18WF8MRF-C1825
	10	**092699** RC18WF10MLF-C1825	**092700** RC18WF10MRF-C1825
	15	**092701** RC18WF15MLF-C1825	**092702** RC18WF15MRF-C1825
	20	**092704** RC18WF20MLF-C1825	**092708** RC18WF20MRF-C1825
	25	**092724** RC18WF25MLF-C1825	**092725** RC18WF25MRF-C1825

Connection cables with plug connector RC18 for CET-AR

Technical data for female connector RC18, straight/angled, with cable

Parameter	Value			Unit
	min.	typ.	max.	
Plug connector		Female connector 19-pin + PE with spring bonding clamp		
Connection		Screw terminal		
Conductor cross-section		16 x 0.5 / 3 x 1.0		mm^2
Material, connector housing		CuZn		
Material, outer sheath		Polyurethane		
Bending radius		min. 10 x cable diameter		mm

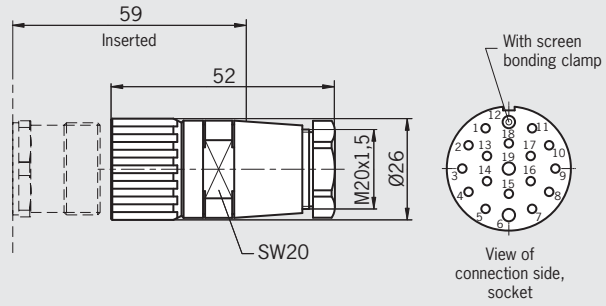
Technical data for female connector RC18, straight/angled, with halogen-free cable

Parameter	Value			Unit
	min.	typ.	max.	
Plug connector		Female connector 19-pin + PE with spring bonding clamp		
Connection		Screw terminal		
Conductor cross-section		16 x 0.5 / 3 x 1.0		mm^2
Material, connector housing		Polyurethane, halogen-free		
Material, outer sheath		Polyurethane, halogen-free		
Material, union nut		CuZn		
Bending radius		min. 10 x cable diameter		mm

Female connector RC18 CET-AR

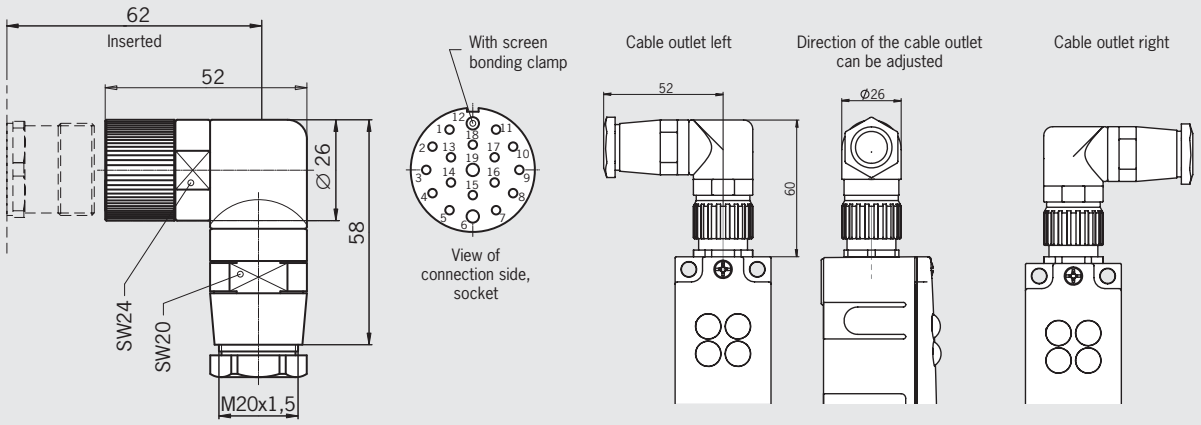
Female connector RC18
18-pin + PE

Dimension drawing



Female connector RC18 angled
18-pin + PE, direction of the cable outlet can be adjusted

Dimension drawing



Ordering table

Series	Comment	Order no.
RC18 [1] 18-pin + PE	**EF** Female connector	**074616** RC18EF
	WF Female connector angled	**074617** RC18WF
	Replacement pin crimp contacts Conductor cross-section 19 x 0.75 - 1 mm2	**094309** Pin crimp contact RCM

1) Crimp contacts included

Technical data

Parameter	Value min.	Value typ.	Value max.	Unit
Grip material		CuZn nickel-plated		
Degree of protection acc. to EN 60529		IP65 (inserted)		

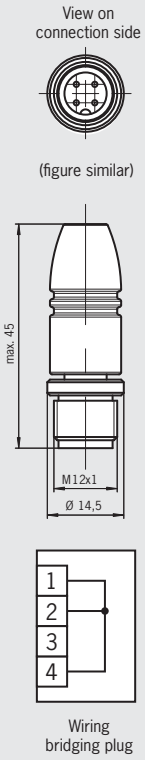
Bridging plug/Y-distributor

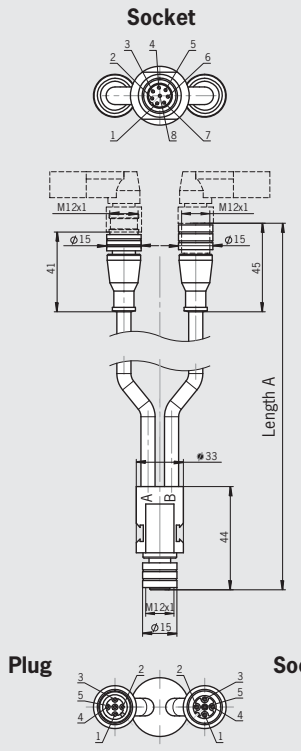
Bridging plug
Male plug 4-pin

Y-distributor M12 with connection cable
1 x 8-pin, 2 x 5-pin

Y-distributor M12
1 x 8-pin, 2 x 5-pin

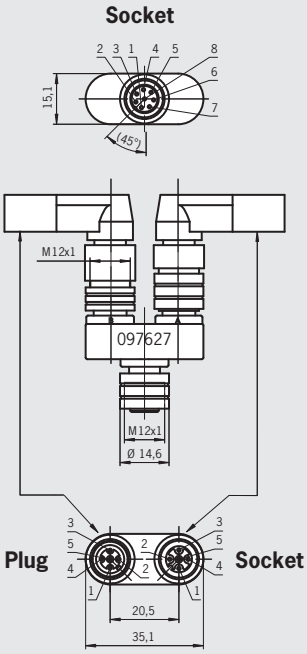
Dimension drawing





Pin	Function	Pin	Function
1	U_B	1	U_B
2	OA	2	IA
3	0 V	3	0 V
4	OB	4	IB
5	RST	5	RST

Note: For the connection to the Y-distributor, 5-pin standard plug connectors M12 can be used.



Pin	Function	Pin	Function
1	U_B	1	U_B
2	OA	2	IA
3	0 V	3	0 V
4	OB	4	IB
5	RST	5	RST

Note: For the connection to the Y-distributor, 5-pin standard plug connectors M12 can be used.

Important: Switch chains must always be terminated with a bridging plug. Switch chains up to maximum 200 m are allowed taking into account the voltage drop due to the cable resistance (see operating instructions of your AR device).

Ordering table

Series	Comment		Order no.
Bridging plug	M12 plug connector 4-pin		**097645** Bridging plug
Y-distributor M12 with connection cable	M12, 1 x 8-pin, 2 x 5-pin	Length A = 200 mm	**111696** Y-distributor with connection cable
		Length A = 1,000 mm	**112395** Y-distributor with connection cable
Y-distributor M12	M12, 1 x 8-pin, 2 x 5-pin		**097627** Y-distributor M12

Technical data for bridging plug

Parameter	Value			Unit
	min.	typ.	max.	
Grip material		TPU, self-extinguishing		
Threaded bushing material		CuZn nickel-plated		
Degree of protection acc. to EN 60529		IP68 (inserted)		

Technical data for Y-distributor M12 with connection cable

Parameter	Value			Unit
	min.	typ.	max.	
Grip material		TPU, self-extinguishing		
Threaded bushing/union nut material		CuZn nickel-plated		
Material, outer sheath		PVC		
Degree of protection acc. to EN 60529		IP67 (inserted)		

Technical data for Y-distributor M12

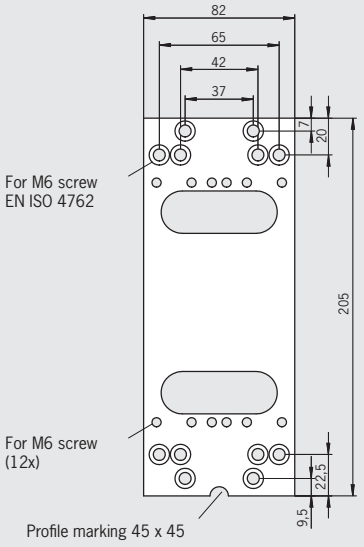
Parameter	Value			Unit
	min.	typ.	max.	
Grip material		TPU, self-extinguishing		
Threaded bushing/union nut material		CuZn nickel-plated		
Degree of protection acc. to EN 60529		IP67 (inserted)		

Mounting plate CET

- **Mounting plate for safety switch CET for hinged or sliding doors**
- **Suitable for aluminum profiles 40 ... 45 mm**
- **Horizontal and vertical mounting**
- **Made of aluminum**
- **Suitable for CET with escape release**

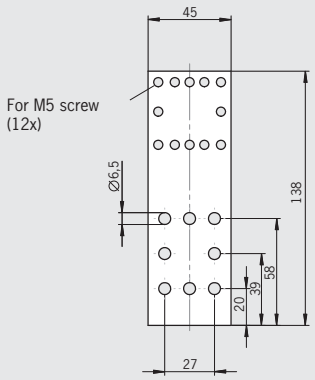
Mounting plate EMP-L-CET
for read head CET

Dimension drawing



Material thickness 10 mm

Mounting plate EMP-B-CET
for actuator CET

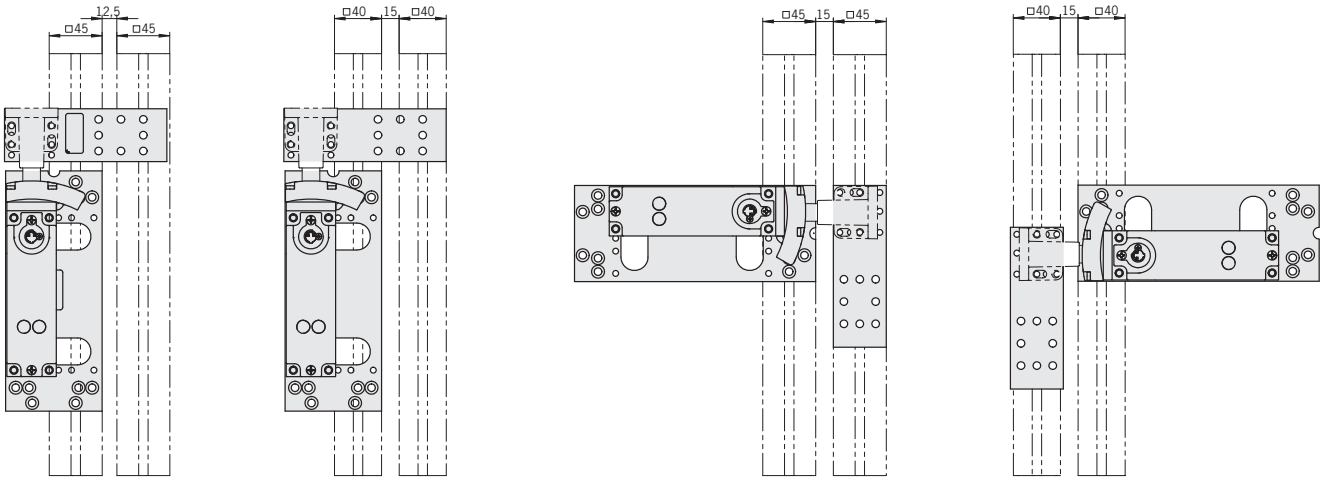


Material thickness 10 mm

Ordering table

Designation	Use	Order no./item
Mounting plate EMP-L-CET	**for safety switch CET**	**106695** EMP-L-CET
Mounting plate EMP-B-CET	**for actuator CET**	**106694** EMP-B-CET

Installation example mounting plates EMP-.-CET



Safety screws

Ordering table

Fixing material/screw size	Version/usage	Packaging unit [qty.]	Order no.
Safety screws **M4 x 14** (small head)	Actuator CES-A-BBA, CES-A-BCA	20	**071863**
Safety screws **M4 x 14** (large head)	Safety switch CES-AR-C.2 and actuator CES-A-BLN-.2	100	**086232**
Safety screws **M5 x 16**	Actuator CES-A-BRN, CET-A-BWK	100	**073456**
Safety screws **M5 x 10**	Safety switch CES-AR-C01-EH-SA and actuator CES-A-BPA	100	**073455**

Miscellaneous accessories

- **Mechanical key release for safety switch CET**
- **Emergency unlocking for safety switch CET**

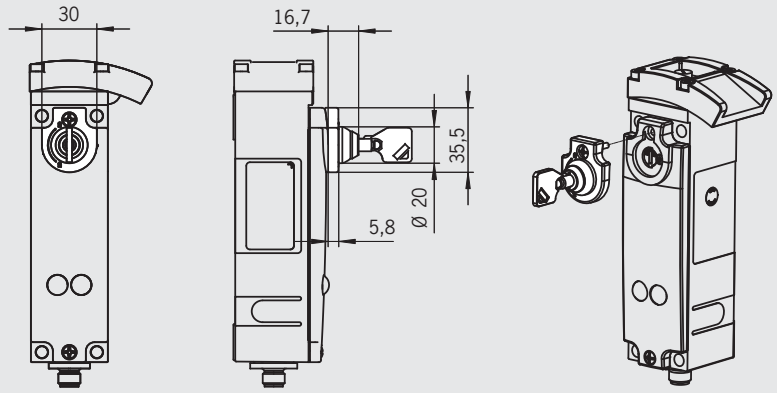
Mechanical key release

The mechanical key release is used in combination with safety switch CET. It enables authorized personnel to actuate the mechanical release using the related key. The unlocking mechanism holds the solenoid in the "unlocked" position.
A screw is used to fix the lock to the cover of the safety switch CET (over the mechanical release). The lock is identical locking.

- Order safety switch CET separately
- 2 keys included (for spare keys see ordering table below)
- Every safety switch in the CET series can be upgraded with the mechanical key release.

Mechanical key release
for safety switch CET

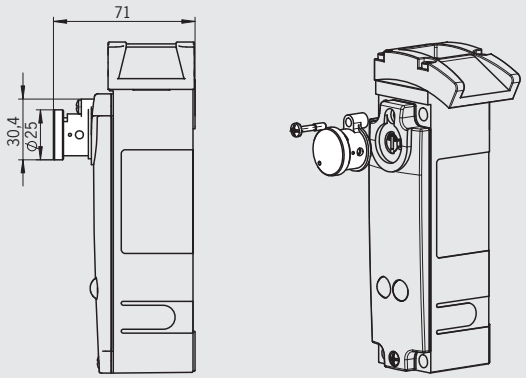
Dimension drawing



Emergency unlocking

Using the emergency unlocking the safety switch can be unlocked manually. In the locked position of the emergency unlocking, a ball detent mechanism prevents unintentional unlocking of the safety switch due to vibration or similar.
In the unlocked position of the emergency unlocking, an integrated bolt engages in a bore on the flange. To reset the emergency unlocking, first the bolt must be pressed inwards, out of the detent mechanism, using a tool.
The emergency unlocking can be lead-sealed (lead seal kit order no. 087256).

Emergency unlocking
for safety switch CET



Ordering table

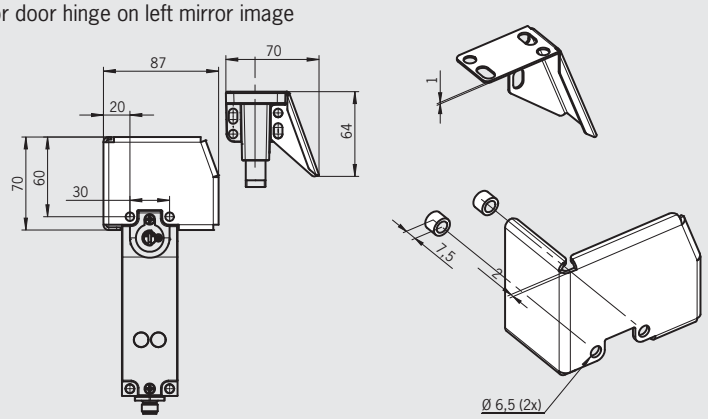
Designation	Use	Version	Order no./item
Mechanical key release	for safety switch CET	identical locking, incl. 2 keys	**098850** Mechanical key release
Replacement key	for mechanical key release, identical locking	2 keys, identical locking	**099434** Replacement key
Emergency unlocking	for safety switch CET	latching in both positions	**103714** Emergency unlocking CET
Lead seal kit	for emergency unlocking		**087256** Lead seal kit for emergency unlocking

- **Cover for safety switch CET**
- **Double ramp for safety switch CET**

Cover
With the CET cover, tampering with the safety switch CET is effectively prevented.
The cover prevents the use of simple tools to manually press up the actuator.

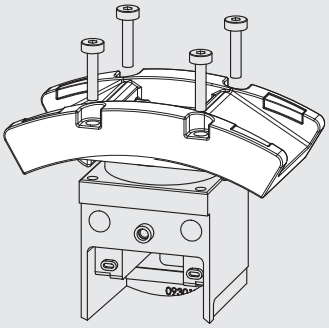
Cover
for safety switch and actuator CET

Cover for door hinge on left mirror image



Double ramp
The ramp can be approached from two sides. It can be passed over, e.g. for sliding doors.

Double ramp
for safety switch CET



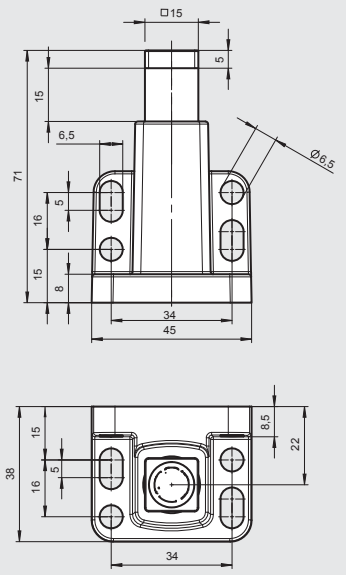
Ordering table

Designation	Use	Version	Order no./item
Cover	for safety switch CET and actuator CET	door hinge right	**098808** CET cover right
		door hinge left	**098807** CET cover left
Double ramp	for safety switch CET		**114091** Double ramp for CET

Miscellaneous accessories

- **Actuator for safety switch CET**
- **Handle for wire front release for safety switch CET**

Actuator CET-A-BWK-50X
for safety switch CET-AR



4 safety screws
M5x16 included

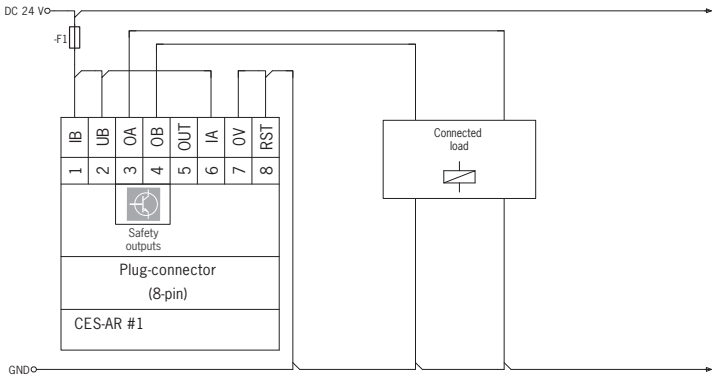
Ordering table

Designation	Version/usage	Order no./item
Actuator for CET...	4 safety screws M5x16 included	**096327** CET-A-BWK-50X
Handle for wire front release	For safety switch CET-AR with wire front release	**099795** Handle for wire front release

Connection examples CES-AR

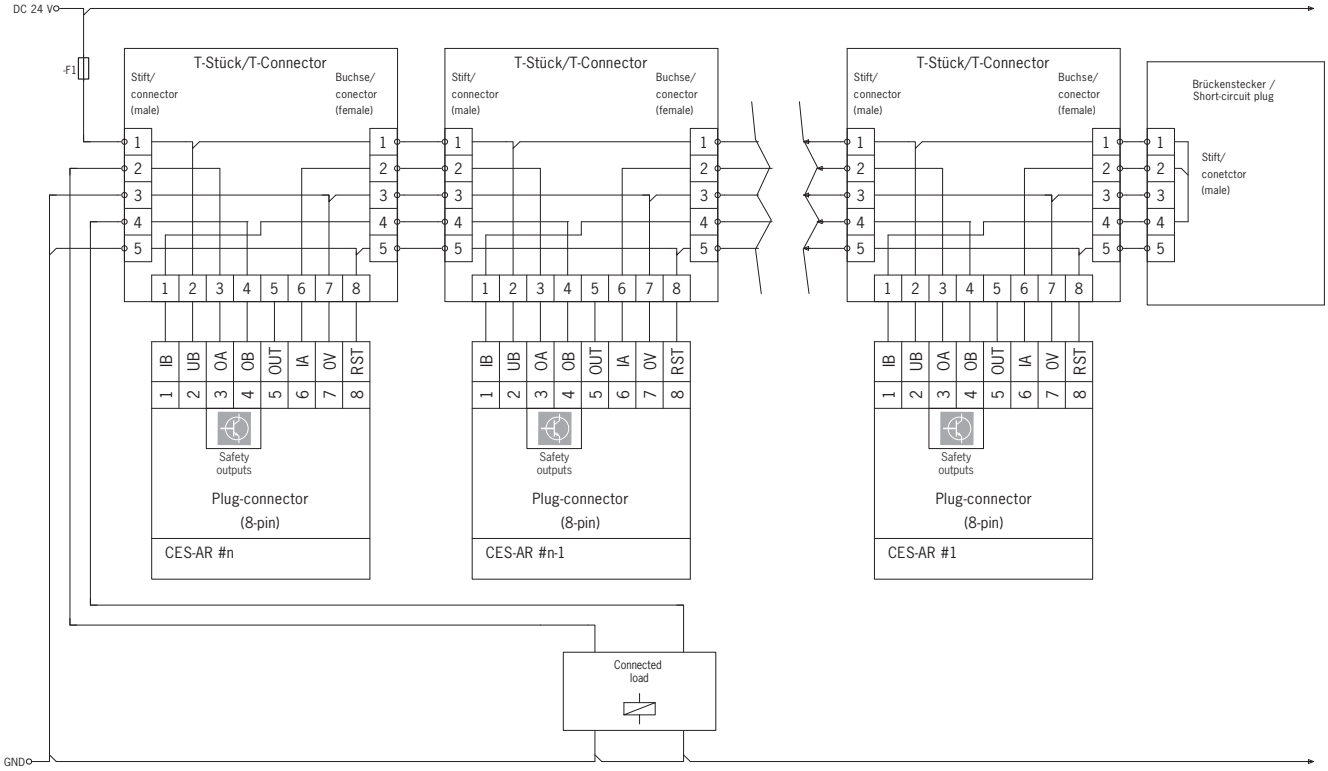
Important: To achieve the stated category in accordance with EN ISO 13849-1, both safety outputs (OA and OB) must be evaluated.

Connection of a single CES-AR-C
If a single CES-AR-C is used, connect the switch as shown in figure below. The OUT output can also be connected here to a control system as a monitoring output.
The switch can be reset via the RST input. To do this, a voltage of 24 V is applied to the RST input for at least 3 seconds. The supply voltage to the switches is interrupted during this time. If input RST is not used in your application, it should be connected to 0 V.



Connection of several CES-AR-C in series
The switches are connected in series using plug connectors and Y-distributors. If, in this connection example, a safety door is opened or if a fault occurs on one of the switches, the system shuts down the machine. A higher level control system can, however, not detect which safety door is open or on which switch a fault has occurred. So that a control system can detect the status of each switch in a switch chain, the monitoring output OUT must be connected separately for each switch. A special AR evaluation unit is required for this purpose (see page 170).
The switches can be reset via the RST input. To do this, a voltage of 24 V is applied to the RST input for at least 3 seconds. The supply voltage to the switches is interrupted during this time. If input RST is not used in your application, it should be connected to 0 V.

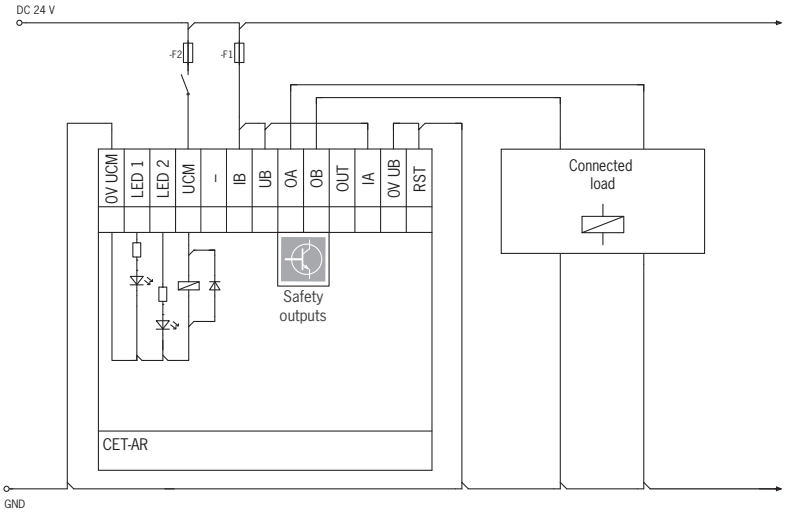
Important: Switch chains must always be terminated with a bridging plug.



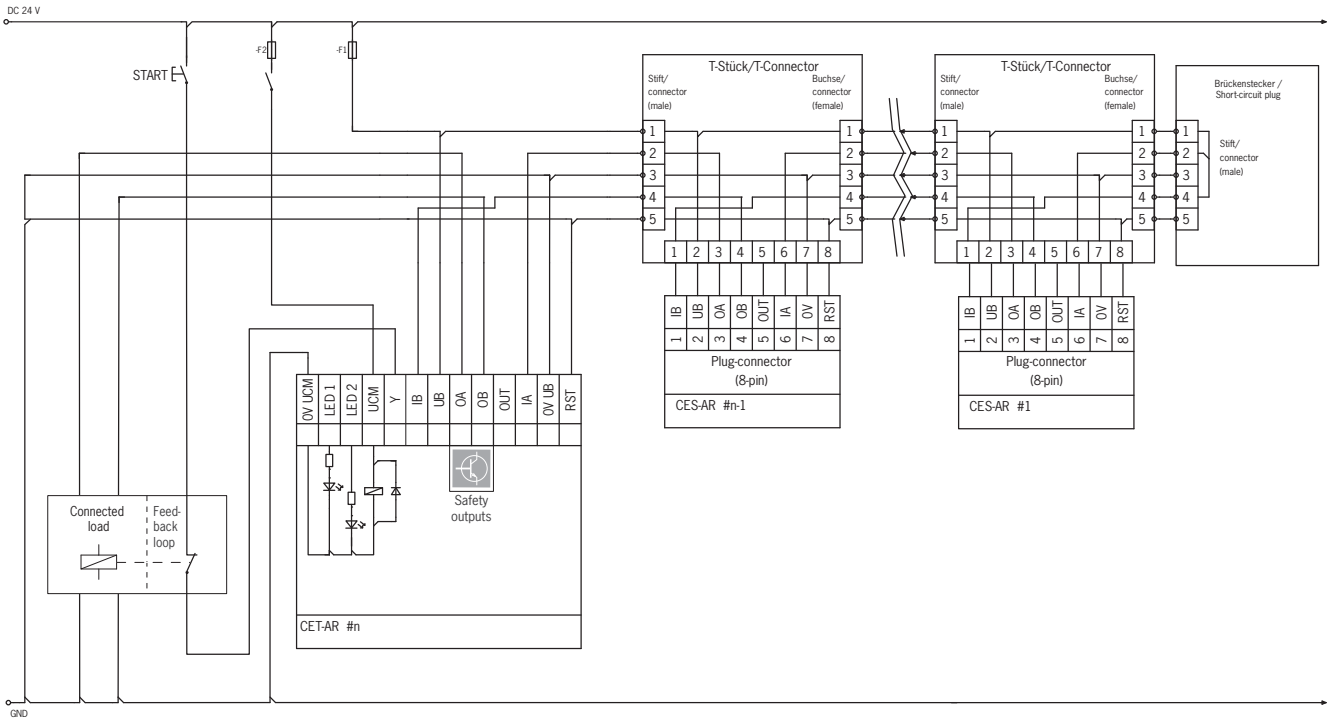
Connection examples CET-AR

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

Connection of a single CET-AR, version without feedback loop
If a single CET-AR is used, connect the switch as shown in figure below. The OUT output can also be connected here to a control system as a monitoring output.
The switch can be reset via the RST input. To do this, a voltage of 24 V is applied to the RST input for at least 3 seconds. The supply voltage to the switches is interrupted during this time. If input RST is not used in your application, it should be connected to 0 V.



Connection of a CET-AR in a CES-AR switch chain



Important: The subsystem CET-AR complies with PL e in accordance with EN 13849-1. To integrate the subsystem in a category 3 or 4 structure, it is necessary to monitor the downstream load (the feedback loop must be monitored).

These examples show only an excerpt that is relevant for connection of the CET system. The example illustrated here does not show complete system planning. The user is responsible for safe integration in the overall system.

AR evaluation unit CES-AR-AES-12

- **Central evaluation of an AR switch chain**
- **Status of each individual switch can be seen**
- **For switch chains of up to 12 devices**
- **Four individual safe relay contacts**
- **Category 4 PLe in accordance with EN ISO 13849-1**

Important: For possible combinations see page 222 or 179.

Function

The AR evaluation unit is used to evaluate the individual safety switches in a CES-AR-... switch chain and to reliably interrupt a safety circuit.
The unit has two inputs for connection of a CES-AR... switch chain. The safety contacts are switched as a function of the input signals. Downstream parts of the safety circuit can be monitored using a feedback loop.
The switching states of the connected safety switches can be signaled by means of monitoring outputs.
If the actuator on one of the safety switches in the switch chain is moved out of the operating distance, the AR evaluation unit opens its contacts and the corresponding monitoring output is reset.
The system is designed so that failures will not result in the loss of the safety function. The occurrence of failures is detected by cyclic self-monitoring at the latest at the next demand to close the safety contacts.
The system can be started either manually using a start button or automatically.

Category according to EN ISO 13849-1

Due to two redundant safety paths (relay contacts) with two internal, monitored normally open contacts per safety path, suitable for:

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

Each safety path is independently safe.

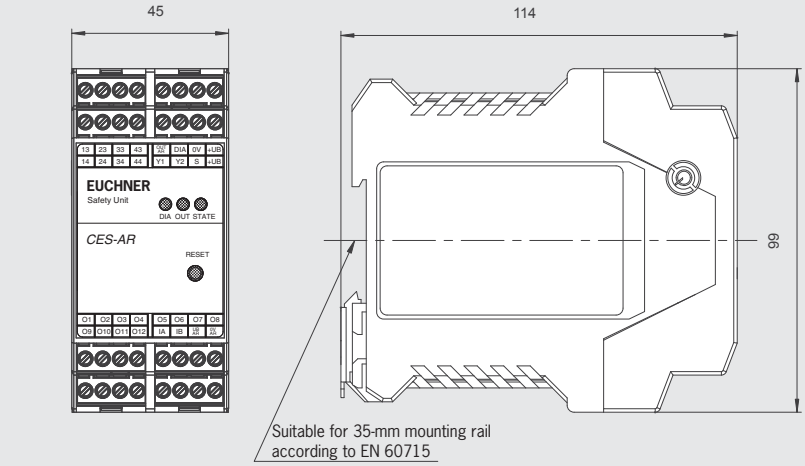
LED indicator

STATE Device status
DIA Fault display
OUT Switch chain status

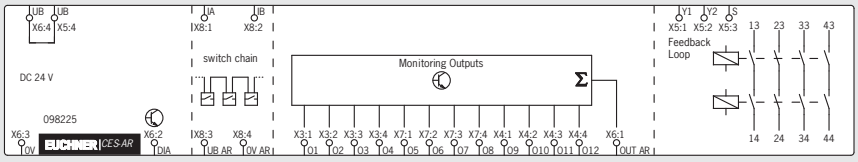
AR evaluation unit CES-AR-AES-12

Cat. 4 / PLe — 1...12

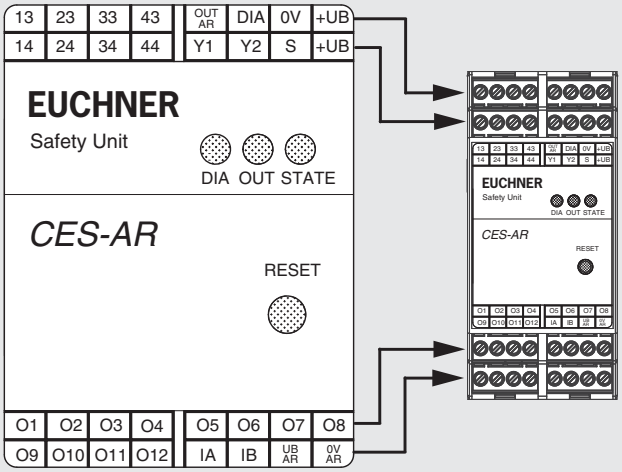
Dimension drawing



Block diagram



Terminal assignment



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 / version	Order no.
CES-AR-AES-12	4 / PL e	**098225** CES-AR-AES-12
Connection sets for evaluation unit CES-AR-AES-12	Plug-in screw terminals	**104776** CES-EA-TC-AK08-104776
	Plug-in spring terminals	**112629** CES-EA-TC-KK08-112629

Which safety switches can be connected?

Evaluation unit	Safety switches
AR evaluation unit CES-AR-AES-12 **098225**	**CES-AR-C01...** from V1.1.2 (see rating plate on the device)
	CES-AR-CR2... from V1.1.2 (see rating plate on the device)
	CES-AR-CL2... from V1.1.2 (see rating plate on the device)
	CET1/2-AR... from V1.1.2 (see rating plate on the device)
	CET3/4-AR... from V1.0.0 (see rating plate on the device)

Technical data for AR evaluation unit CES-AR-AES-12

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic PA6.6		
Dimensions		114 x 99 x 22.5		mm
Mass		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		2		
Mounting		Mounting rail 35 mm according to EN 60715		
Connection (plug-in screw terminals/coded)	0.14	-	2.5	mm^2
Operating voltage U_B (regulated, residual ripple < 5%)		24 ± 10% (PELV)		V DC
Current consumption I_B (with relay energized) 1)	-	1.2 1)	-	A
External fuse (operating voltage U_B)	-	2.5	8	A gG
Safety contacts		4 (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	-	6,000	
- at switching voltage AC 5 … 230 V	10	-	5,000	
External fuse (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 5A / DC-13 24V 5A		
Rated insulation voltage U_i		250		V
Rated impulse withstand voltage U_{imp}		4		kV
Resilience to vibration		according to EN 60947-5-2		
Mechanical operating cycles (relays)		10 x 10^6		
Current via feedback loop Y1/Y2	5	8	10	mA
Permissible resistance via feedback loop	-	-	600	Ω
Monitoring outputs (O1 … O12, DIA and OUT AR, semiconductor outputs, p-switching, short circuit-proof)				
- Output voltage	0.8 x U_B	-	U_B	V DC
- Max. load	-	-	20	mA
- Switching frequency	-	1	-	Hz
Start button input S, test input TST				V DC
- Input voltage LOW	0	-	2	
HIGH	15	-	U_B	
- Input current HIGH	5	8	10	mA
Safety inputs IA, IB		2 (for AR switch chain)		
Number of connectible safety switches		Max. 12		
EMC protection requirements		according to EN 60947-5-3		
Reliability values 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		1.5 x 10^{-8}		
Mission time		20		years
Number of switching cycles/year	720,000	540,000	107,000	

1) Taking into account the load currents at the monitoring outputs (20 mA each)

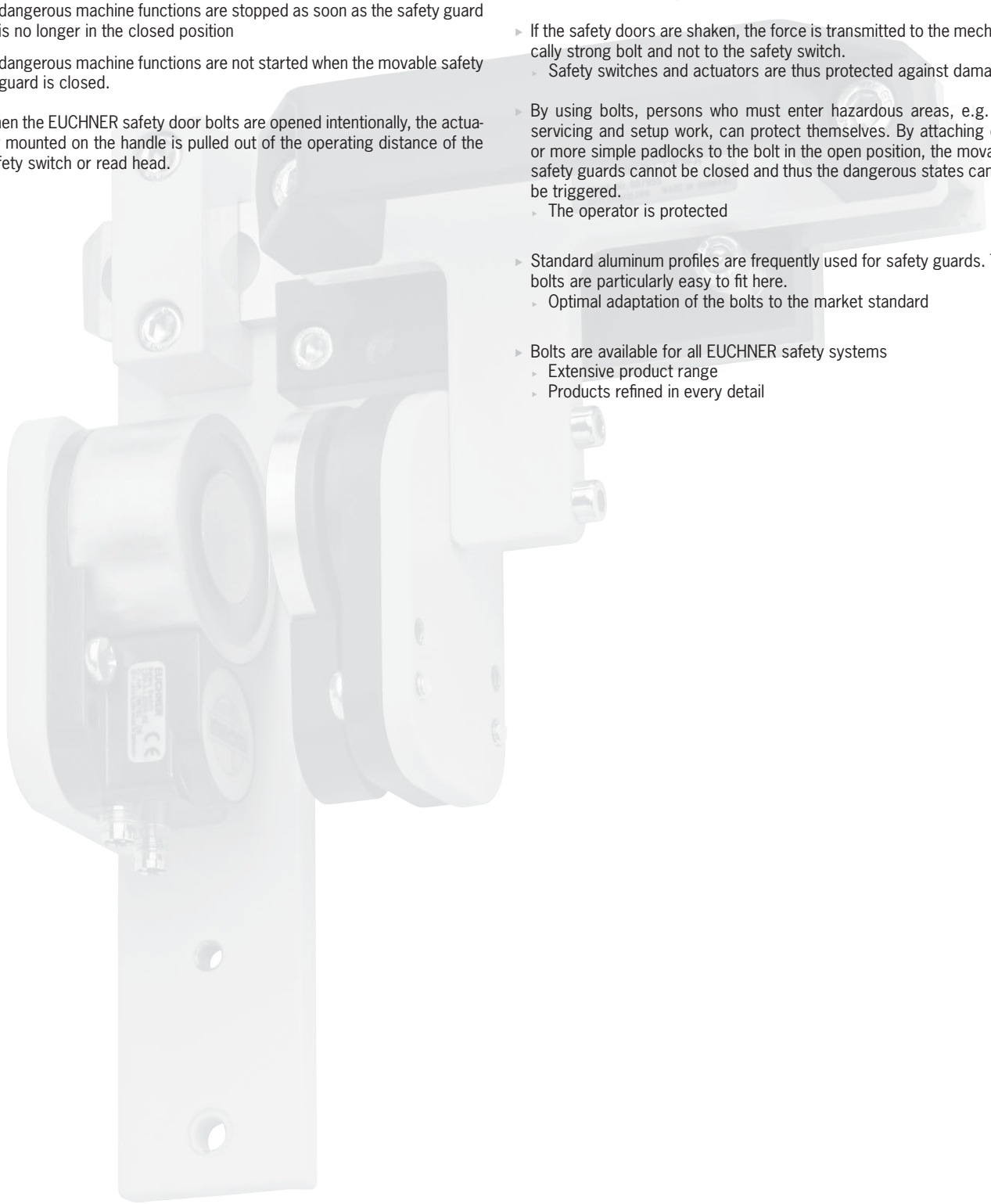
Bolts for safety guards

According to EN 12100-2 movable safety guards must be equipped with an interlocking device, with or without guard locking.

Here it must be ensured that

- dangerous machine functions are stopped as soon as the safety guard is no longer in the closed position
- dangerous machine functions are not started when the movable safety guard is closed.

When the EUCHNER safety door bolts are opened intentionally, the actuator mounted on the handle is pulled out of the operating distance of the safety switch or read head.

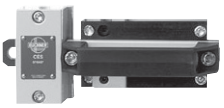


Bolts for safety guards offer important advantages:

- Bolts provide mechanical guard locking, i.e. the monitoring circuit cannot be opened unintentionally by moving the hinged door.
  - Accidental stoppage of the machine is prevented
- If the safety doors are shaken, the force is transmitted to the mechanically strong bolt and not to the safety switch.
  - Safety switches and actuators are thus protected against damage
- By using bolts, persons who must enter hazardous areas, e.g. for servicing and setup work, can protect themselves. By attaching one or more simple padlocks to the bolt in the open position, the movable safety guards cannot be closed and thus the dangerous states cannot be triggered.
  - The operator is protected
- Standard aluminum profiles are frequently used for safety guards. The bolts are particularly easy to fit here.
  - Optimal adaptation of the bolts to the market standard
- Bolts are available for all EUCHNER safety systems
  - Extensive product range
  - Products refined in every detail

Bolt CES-A-A

- **In combination with read head CES-A-LNA...**
- **For doors hinged on the right or left**



Special features

- Easy mounting of the read head on the bracket for the bolt tongue
- Uniquely coded actuator (one-off)
  - maximum protection against tampering
- Ball detent mechanism in closed bolt position
  - protection against vibration

Features

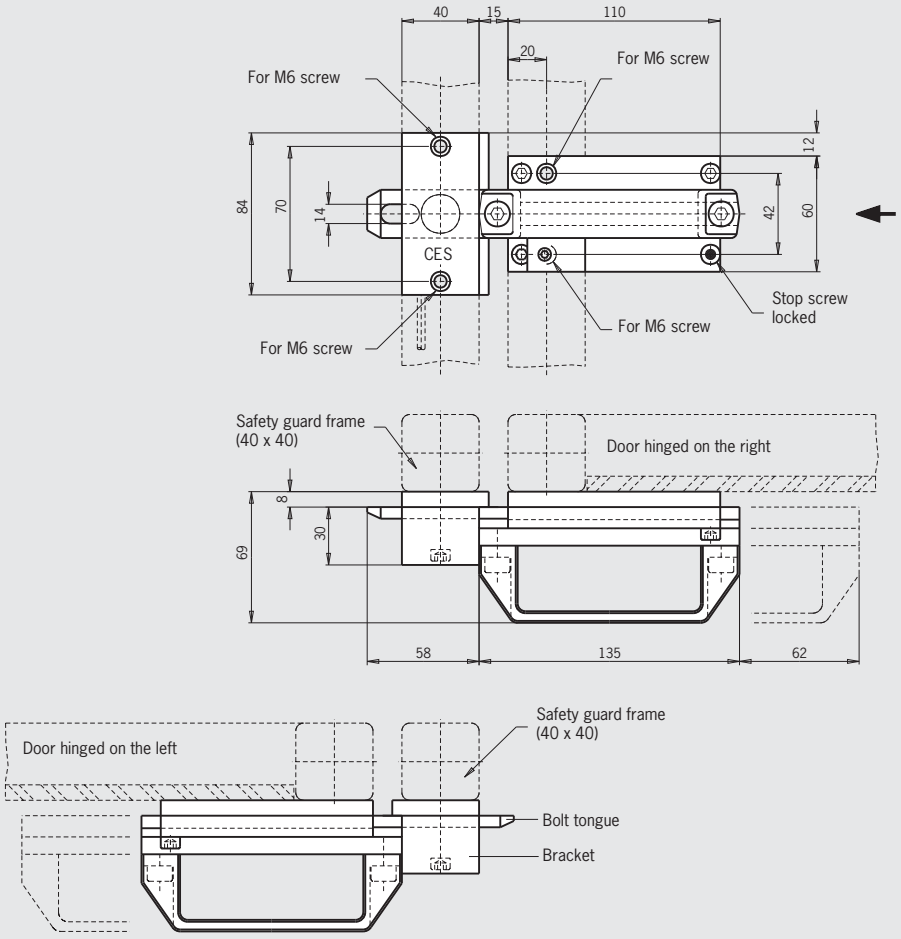
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes

- CES actuator integrated in the bolt tongue
- Order read head and evaluation unit separately
- Other bolt types on request

Bolt CES-A-A

Dimension drawing



Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CES-A-A	Closed position: ball detent mechanism Open position: none	For doors hinged on the right or left	**076487**

Bolt CES-A-A/F

- **Lever for escape release from the danger area**
- **In combination with read head CES-A-LNA...**
- **For doors hinged on the right or left**

Special features

- Easy mounting of the read head on the bracket for the bolt tongue
- Uniquely coded actuator (one-off)
  - maximum protection against tampering
- Bolt with detent mechanism
  - bolt latches in open position to prevent unintended closing

Features

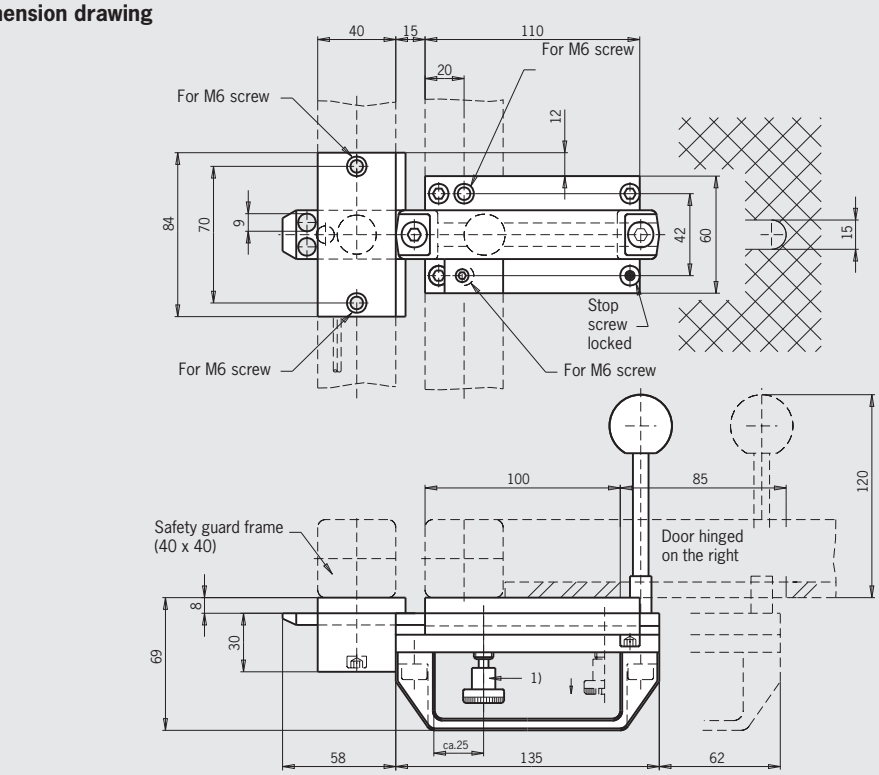
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

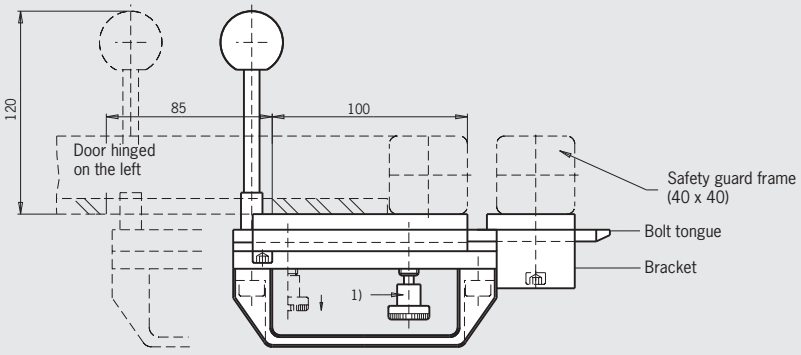
Notes

- CES actuator integrated in the bolt tongue
- Order read head and evaluation unit separately

Bolt CES-A-A/F

Dimension drawing





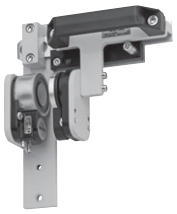
1) Bolt with detent mechanism. Latches in open position and prevents unintentional closing of the bolt. Unlocked by pulling the detent knob upward.

Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CES-A-A/F	Closed position: none Open position: detent knob	For doors hinged on the right or left	**086173**

Bolts CEM-A and CEM-C

- **In combination with read head CEM-A-LE05...**
- **For doors hinged on the right or left**



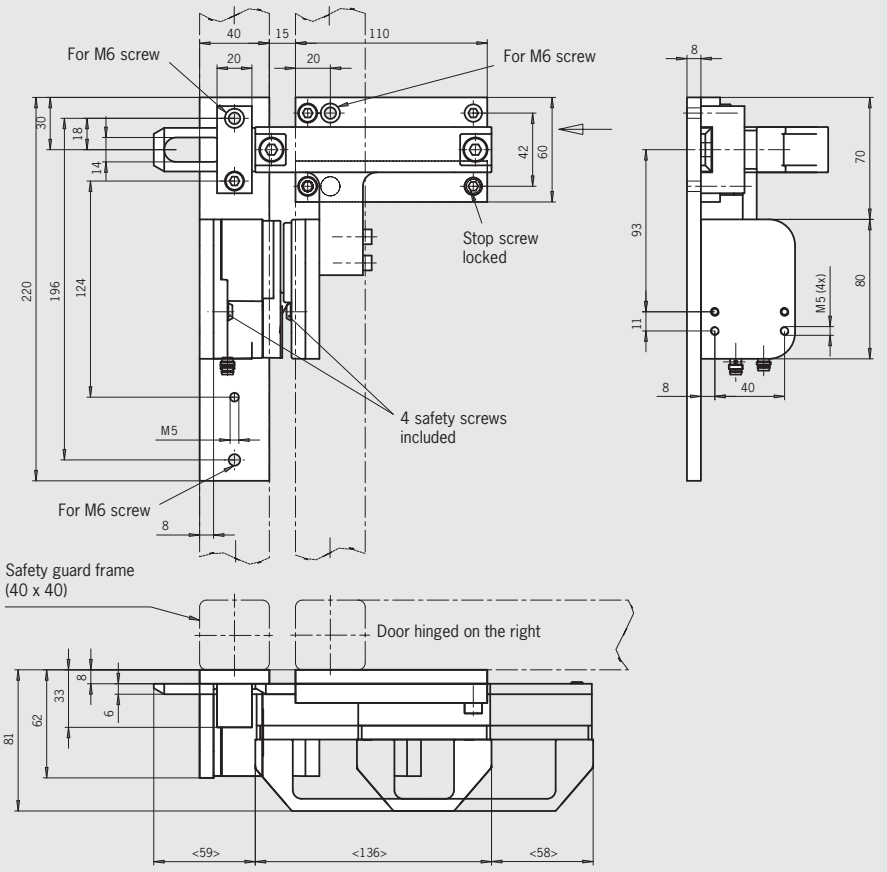
Special features
- Easy read head mounting
- Uniquely coded actuator (one-off)
  - maximum protection against tampering

Features
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- No additional door handle necessary

Notes
- Order read head, actuator and evaluation unit separately
- Other bolt types (e.g. with mechanical detent mechanism in closed bolt position) on request

Bolt CEM-A
Bolt CEM-C mirror image

Dimension drawing

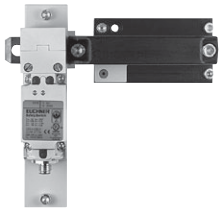


Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CEM-A	Without	For doors hinged on the right	**097955**
Bolt CEM-C	Without	For doors hinged on the left	**097957**

Bolt CES-A-C

- **For non-contact safety switch CES-A-C.../ CES-A-W.../CES-AR...**
- **Connection via M12 plug connector**
- **For doors hinged on the right or left**



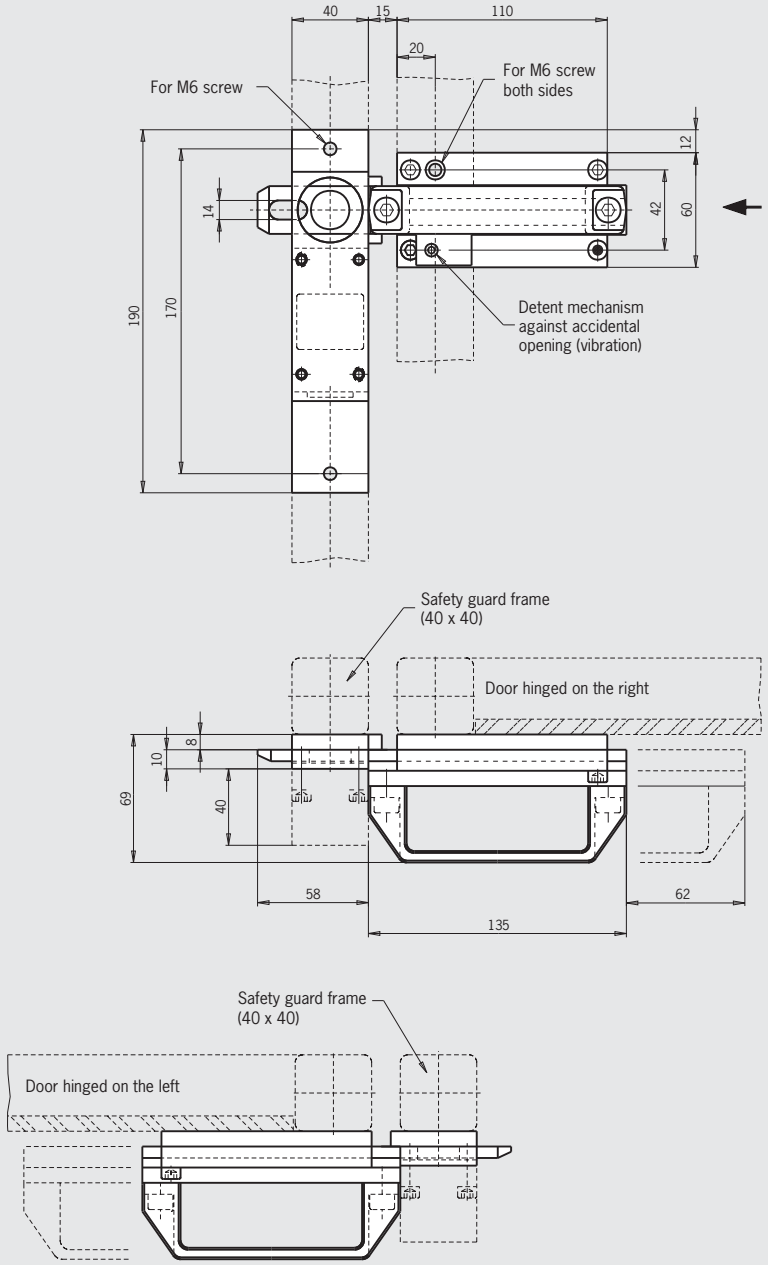
Special features
- Easy mounting of the safety switch on the bracket for the bolt tongue
- Uniquely coded actuator (one-off)
  - maximum protection against tampering
- Ball detent mechanism in closed bolt position
  - protection against vibration

Features
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes
- CES actuator integrated in the bolt tongue
- Order safety switch separately
- Other bolt types (e.g. with mechanical detent mechanism in closed bolt position) on request

Bolt CES-A-C

Dimension drawing

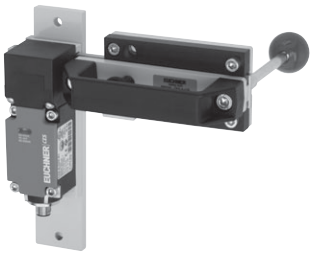


Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CES-A-C	Closed position: ball detent mechanism Open position: none	For doors hinged on the right or left	**082220**

Bolt CES-A-C/F

- **Lever for escape release from the danger area**
- **For non-contact safety switch CES-A-C.../ CES-A-W.../CES-..-C01-...**
- **Connection via M12 plug connector**
- **For doors hinged on the right or left**



Special features

- Easy mounting of the safety switch on the bracket for the bolt tongue
- Uniquely coded actuator (one-off)
  - maximum protection against tampering
- Bolt with detent mechanism
  - bolt latches in open position to prevent unintended closing
- Ball detent mechanism in closed bolt position
  - protection against vibration

Features

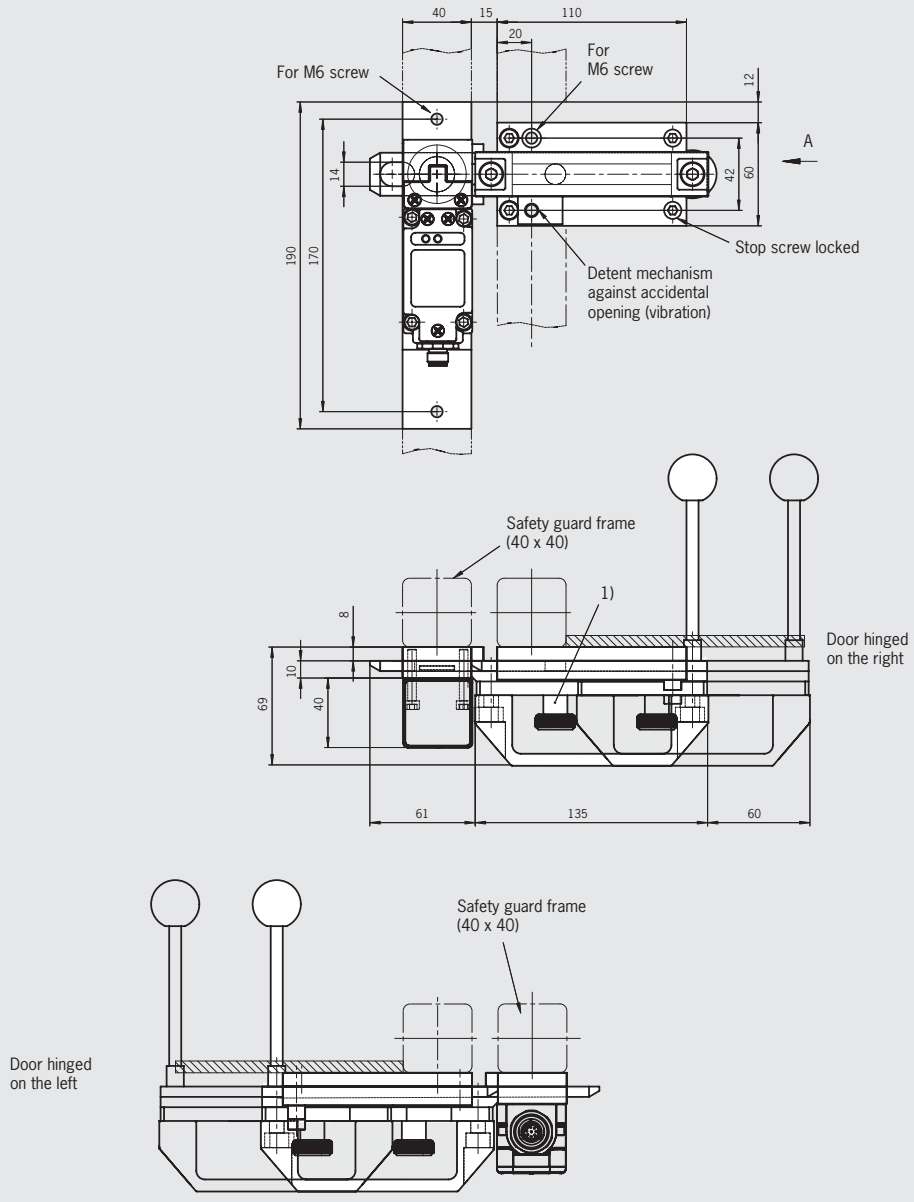
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes

- CES actuator integrated in the bolt tongue
- Order safety switch separately

Bolt CES-A-C/F

Dimension drawing



1) Bolt with detent mechanism. Latches in open position and prevents unintentional closing of the bolt. Unlocked by pulling the detent knob upward.

Ordering table

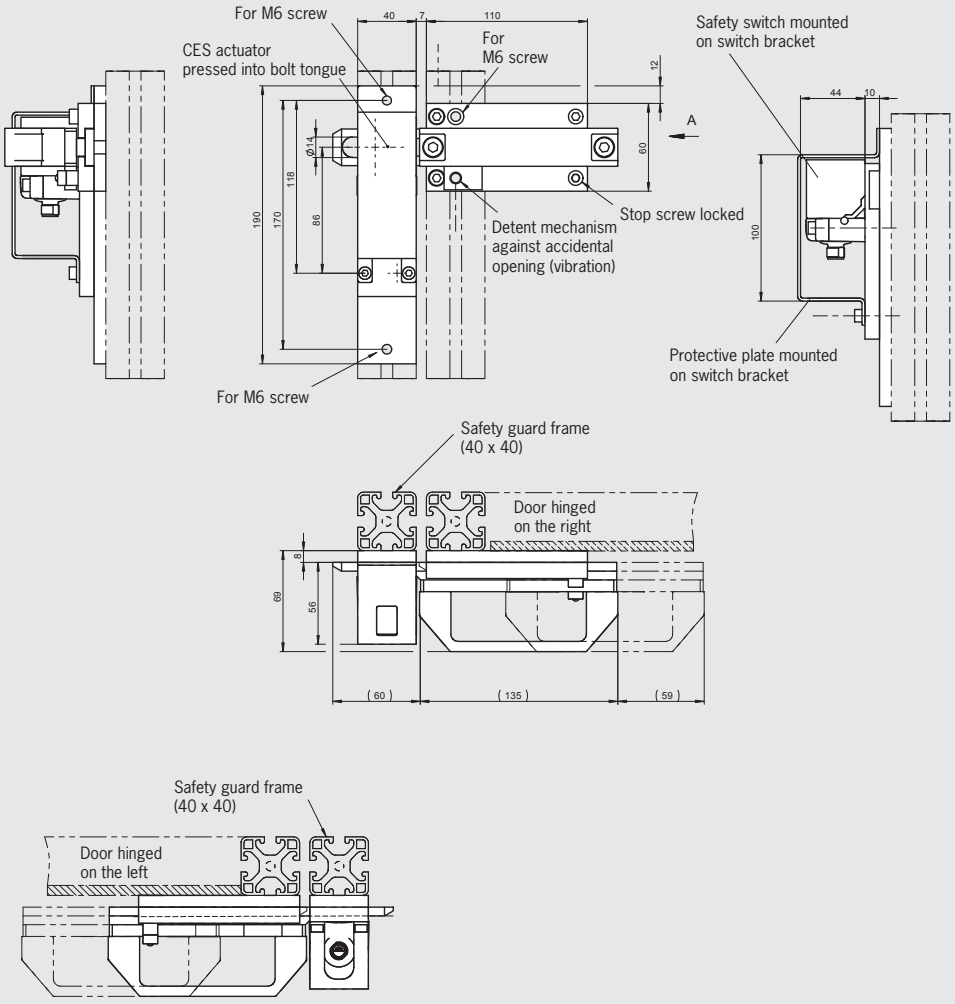
Designation	Detent mechanism	Version	Order no.
Bolt CES-A-C/F	Closed position: ball detent mechanism Open position: detent knob	For doors hinged on the right or left	**098357**

Bolt CES-AC-AR-C01-AH-SA-C2296

- **Safety switch already pre-assembled**
- **Connection via M12 plug connector**
- **For doors hinged on the right or left**
- **Protective plate for safety switch**

Bolt CES-AC-AR-C01-AH-SA-C2296

Dimension drawing



1) Bolt with detent mechanism. Latches in closed position and prevents unintended opening of the bolt.

Special features

- Uniquely coded actuator (one-off)
  - maximum protection against tampering
- Bolt with detent mechanism
  Ball detent mechanism in closed bolt position
  - protection against vibration

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes

- CES actuator integrated in the bolt tongue
- Safety switch CES-AR-C01-AH-SA-098941 or CES-AP-C01-AH-SB-111145 included
- You will find information on the safety switch on page 182

Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CES-AC-AR-C01-AH-SA-C2296	Closed position: ball detent mechanism	Bolt with pre-assembled safety switch CES-AR-C01-AH-SA-098941 for doors hinged on the right or left	**109358**
Bolt CES-AC-AP-C01-AH-SB-C2296	Closed position: ball detent mechanism	Bolt with pre-assembled safety switch CES-AP-C01-AH-SB-111145 for doors hinged on the right or left	**113986**

Bolt CES-ACR1-AR-C01-AH-SA-104028

- **Safety switch already pre-assembled**
- **With safety plate**
- **Connection via M12 plug connector**
- **For doors hinged on the right or left**
- **Protective plate for safety switch**

Special features

- Uniquely coded actuator (one-off)
  - maximum protection against tampering
- Bolt with detent mechanism
  - bolt latches in open position to prevent unintended closing
- Ball detent mechanism in closed bolt position
  - protection against vibration

Features

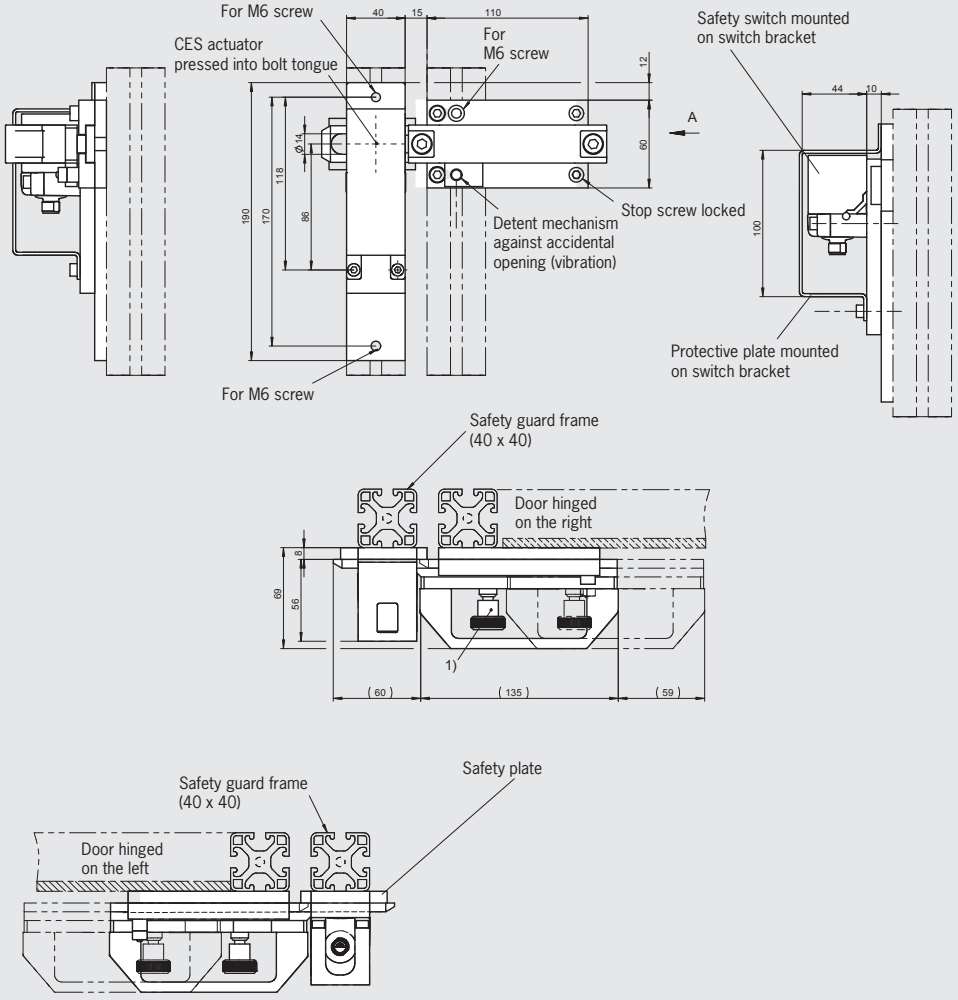
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes

- CES actuator integrated in the bolt tongue
- Safety switch CES-AR-C01-AH-SA-098941 included
- You will find information on the safety switch on page 182

Bolt CES-ACR1-AR-C01-AH-SA-104028

Dimension drawing



1) Bolt with detent mechanism. Latches in open position and prevents unintentional closing of the bolt. Unlocked by pulling the detent knob upward.

Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CES-ACR1-AR-C01-AH-SA-104028	Closed position: ball detent mechanism Open position: detent knob	Bolt with pre-assembled safety switch CES-AR-C01-AH-SA-098941 and safety plate for doors hinged on the right or left	**104028**

Bolt CES-AC/F-A.-C01-AH-S.-...

- **Lever for escape release from the danger area**
- **Safety switch already pre-assembled**
- **With safety plate**
- **Connection via M12 plug connector**
- **For doors hinged on the right or left**
- **Protective plate for safety switch**

Special features

- Uniquely coded actuator (one-off)
  - maximum protection against tampering
- Bolt with detent mechanism
  - bolt latches in open position to prevent unintended closing
- Ball detent mechanism in closed bolt position
  - protection against vibration

Features

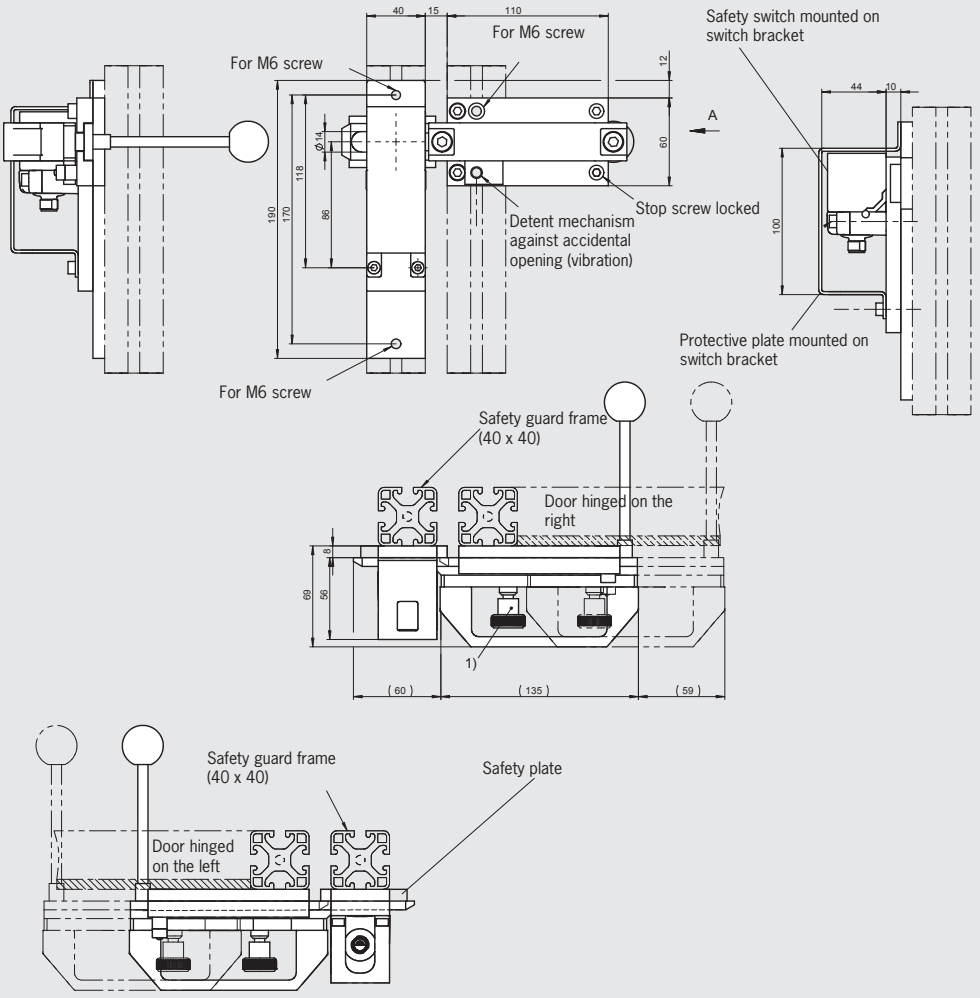
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes

- CES actuator integrated in the bolt tongue
- Safety switch
  CES-AR-C01-AH-SA-098941 or
  CES-AP-C01-AH-SB-111145 or
  CES-AP-C01-CH-SB-111708 included
- Information about the safety switches can be found on pages 130 and 182

Bolt CES-AC/F-A.-C01-AH-S.-...

Dimension drawing



1) Bolt with detent mechanism. Latches in open position and prevents unintentional closing of the bolt. Unlocked by pulling the detent knob upward.

Ordering table

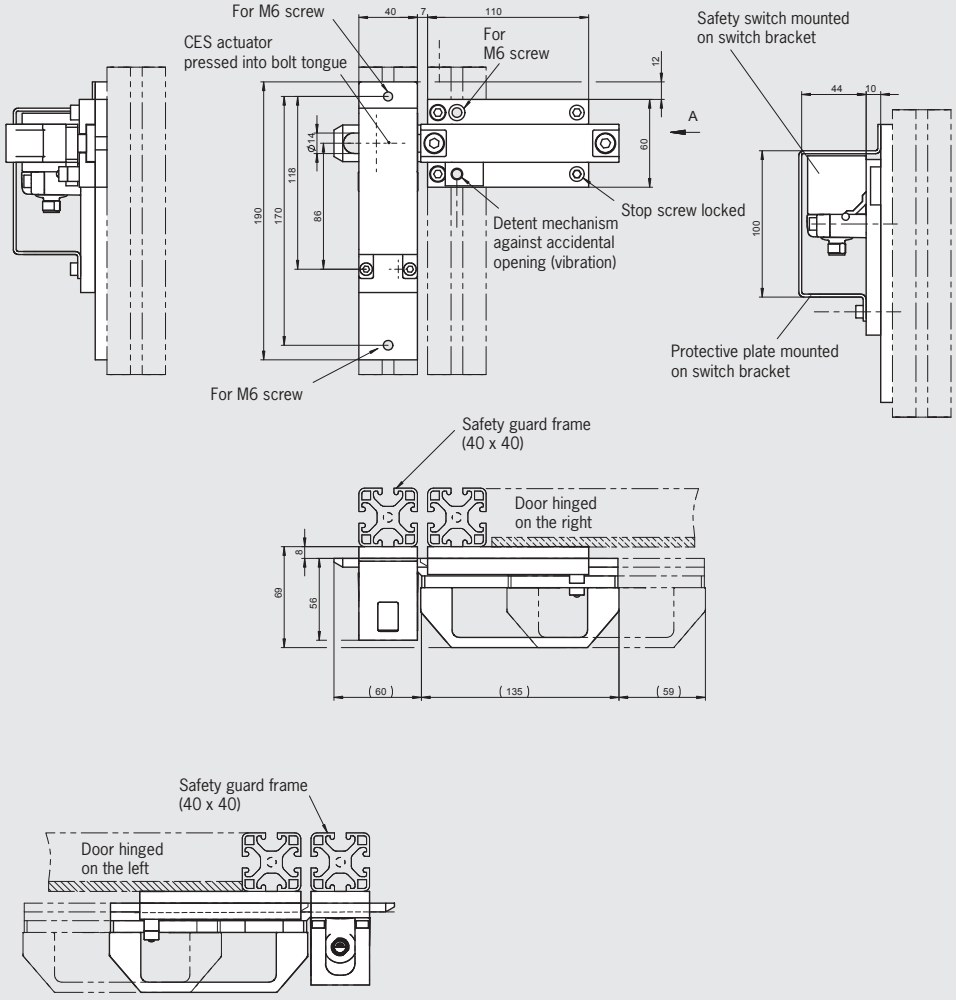
Designation	Detent mechanism	Version	Order no.
Bolt CES-AC/F-AR-C01-AH-SA-105619	Closed position: ball detent mechanism Open position: detent knob	Bolt with pre-assembled safety switch CES-AR-C01-AH-SA-098941 and safety plate for doors hinged on the right or left	**105619**
Bolt CES-AC/F-AP-C01-AH-SB-116246	Closed position: ball detent mechanism Open position: detent knob	Bolt with pre-assembled safety switch CES-AP-C01-AH-SB-111145 and safety plate for doors hinged on the right or left	**116246**
Bolt CES-AC/F-AP-C01-CH-SB-115732	Closed position: ball detent mechanism Open position: detent knob	Bolt with pre-assembled safety switch CES-AP-C01-CH-SB-111708 and safety plate for doors hinged on the right or left	**115732**

Bolt CES-AC-AP-C01-CH-SB-110355

- **Safety switch already pre-assembled**
- **Connection via M12 plug connector**
- **For doors hinged on the right or left**

Bolt CES-AC-AP-C01-CH-SB-110355

Dimension drawing



1) Bolt with detent mechanism. Latches in closed position and prevents unintended opening of the bolt.

Special features

- Multicode safety switch (no teach-in operation necessary)
- Bolt with detent mechanism Ball detent mechanism in closed bolt position
  - protection against vibration

Features

- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes

- CES actuator integrated in the bolt tongue
- Safety switch CES-AP-C01-CH-SB-106798 or CES-AP-C01-CH-SB-111708 included
- You will find information on the safety switch on page 130

Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CES-AC-AP-C01-CH-SB-110355	Closed position: ball detent mechanism	Bolt with pre-assembled safety switch CES-AP-C01-CH-SB-106798 for doors hinged on the right or left	**110355**
Bolt CES-AC-AP-C01-CH-SB-110354	Closed position: ball detent mechanism	Bolt with pre-assembled safety switch CES-AP-C01-CH-SB-111708 for doors hinged on the right or left	**110354**

Bolt CET-A-C

- **In combination with CET**
- **For doors hinged on the right or left**

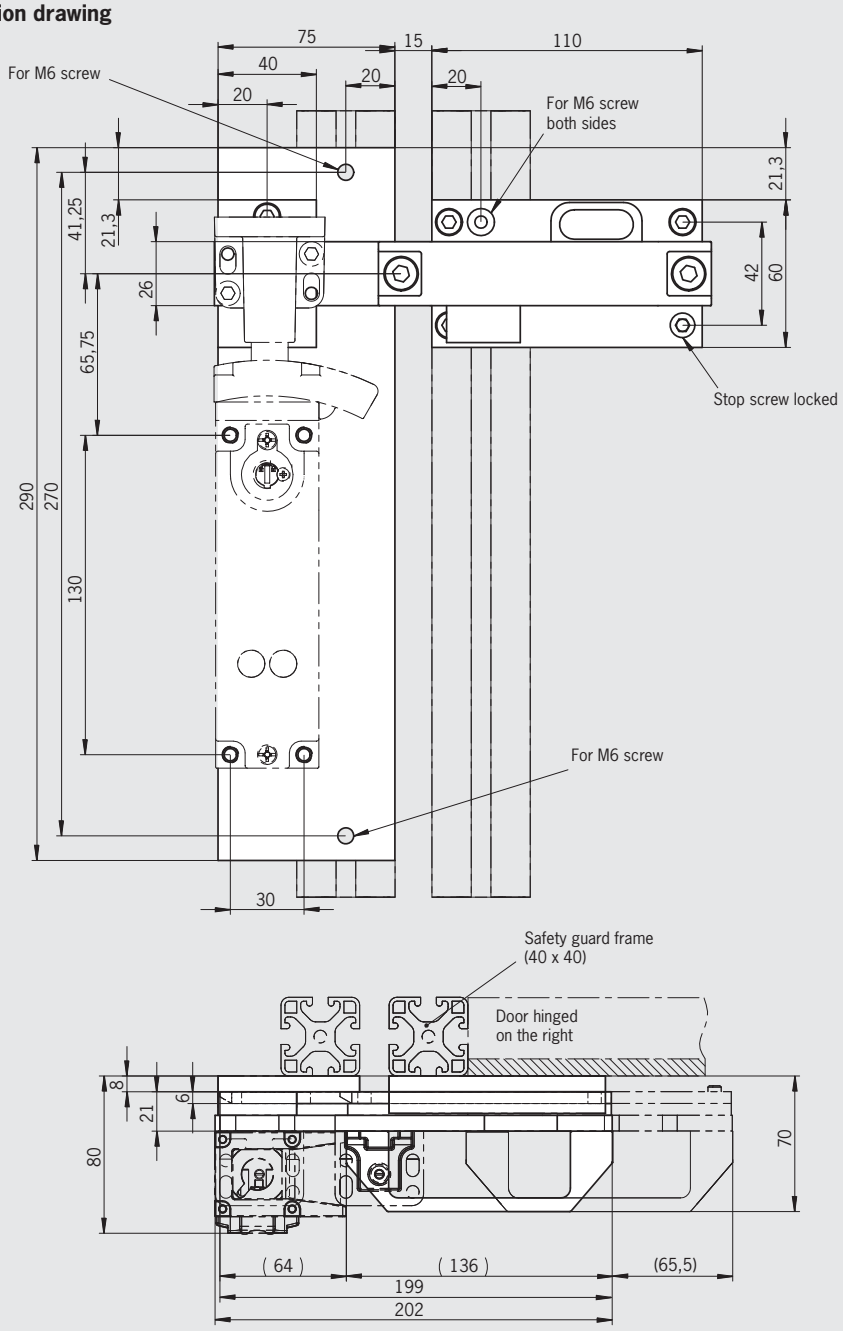
Special features
- Easy assembly
- Uniquely coded actuator (one-off)
  - maximum protection against tampering

Features
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes
- Order read head, actuator and evaluation unit separately
- Other bolt types (e.g. with mechanical detent mechanism in closed bolt position) on request
- The installation position of the safety switch/read head affects the safety category (see pages 63, 148 and 194)

Bolt CET-A-C

Dimension drawing



Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CET-A-C	Without	For doors hinged on the right or left	**104309**
Bolt CET-A-C/F	Closed position: none Open position: detent knob	For doors hinged on the right or left, for CET with escape release	**106172**
Actuator CET	-	Locking force 5,000 N	**096327** CET-A-BWK-50X

Bolt CET-A-C-C2308

- **In combination with CET**
- **Specially suited for swing doors**
- **For doors hinged on the right or left**

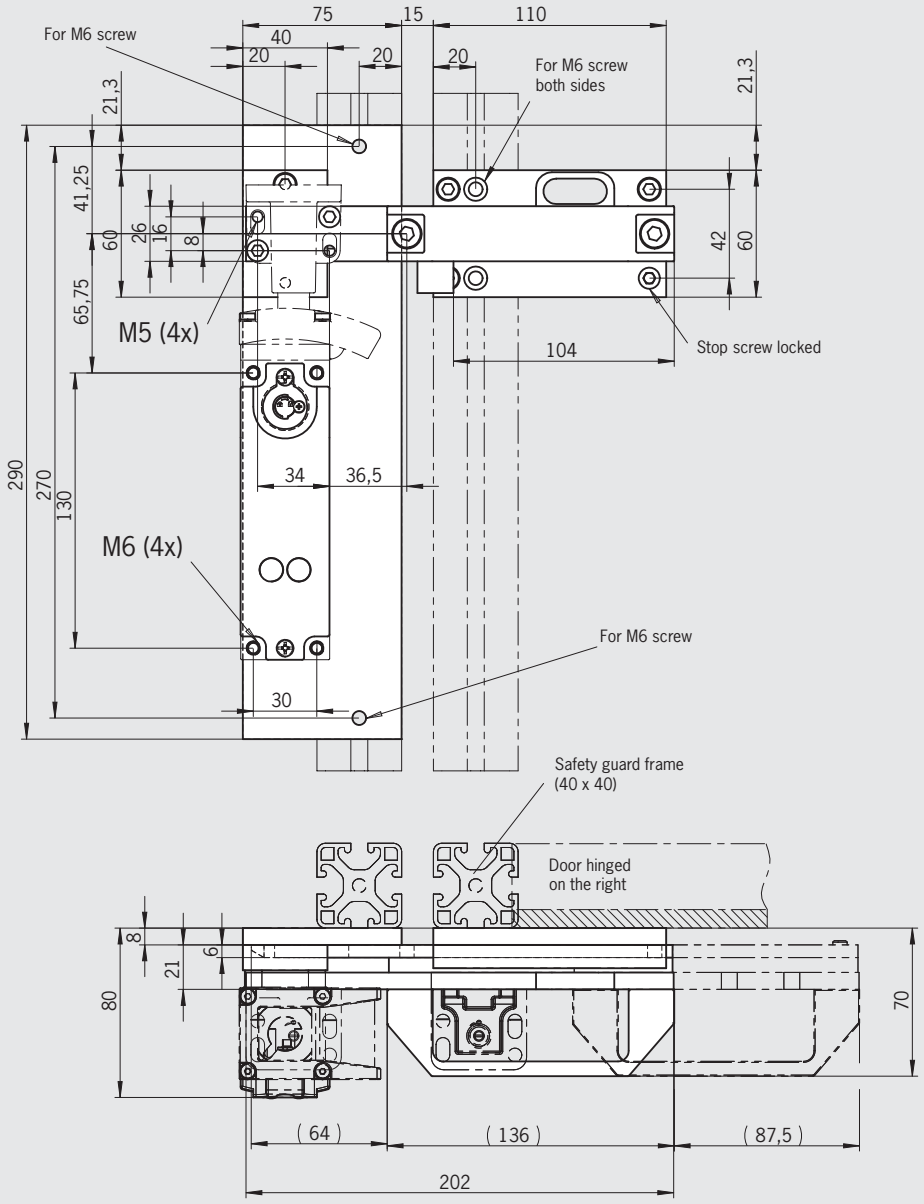
Special features
- Allows door to be opened outward and inward, making it particularly suitable for swing doors
- Easy assembly
- Uniquely coded actuator (one-off)
  - maximum protection against tampering

Features
- Easily fitted to standard aluminum profiles and machine covers by screw connection
- Distinctive yellow color for easy recognition
- Symmetrical design for doors hinged on the right or left
- No additional door handle necessary

Notes
- Order read head, actuator and evaluation unit separately
- Other bolt types (e.g. with mechanical detent mechanism in closed bolt position) on request
- The installation position of the safety switch/read head affects the safety category (see pages 63, 148 and 194)

Bolt CET-A-C-C2308

Dimension drawing



Ordering table

Designation	Detent mechanism	Version	Order no.
Bolt CET-A-C-C2308	Without	For doors hinged on the right or left. Bolt can be opened outward and inward (no stop).	**109672**
Actuator CET	-	Locking force 5,000 N	**096327** CET-A-BWK-50X

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