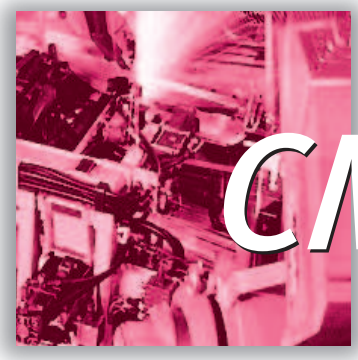
Non-Contact Safety Switch



CMS.

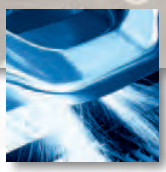
Magnetic Coding

More than safety.

EUCHNER

More than safety.

Emil Euchner, the company's founder and inventor of the multiple limit switch, circa 1928.



Around the world – the Swabian specialists in motion sequence control for mechanical and systems engineering.

EUCHNER's history began in 1940 with the establishment of an engineering office by Emil Euchner. Since that time, EUCHNER has been involved in the design and development of switchgear for controlling a wide variety of motion sequences in mechanical and systems engineering. In 1953, Emil Euchner founded EUCHNER + Co., a milestone in the company's history. In 1952, he developed the first multiple limit switch – to this day a symbol of the enterprising spirit of this family-owned company.

Automation – Safety – ManMachine

Today, our products range from electromechanical and electronic components to complex system solutions. With this wide range of products we can provide the necessary technologies to offer the right solution for special requirements – regardless of whether these relate to reliable and precise positioning or to components and systems for safety engineering in the automation sector.
EUCHNER products are sold through a world-wide sales network of competent partners. With our closeness to the customer and the guarantee of reliable solutions throughout the globe, we enjoy the confidence of customers all over the world.

Quality, reliability, precision

Quality, reliability and precision are the hallmarks of our corporate philosophy. They represent concepts and values to which we feel totally committed.
At EUCHNER, quality means that all our employees take personal responsibility for the company as a whole and, in particular, for their own field of work. This individual commitment to perfection results in products which are ideally tailored to the customers' needs and the requirements of the market. After all: our customers and their needs are the focus of all our efforts. Through efficient and effective use of resources, the promotion of personal initiative and courage in finding unusual solutions to the benefit of our customers, we ensure a high level of customer satisfaction. We familiarize ourselves with their needs, requirements and products and we learn from the experiences of our customers' own customers.

EUCHNER – More than safety.

Quality – made by EUCHNER

Contents

Non-Contact Safety Switches CMS

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General

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.

Safety switches without guard locking are used if the control concept is structured in such a way as to ensure that:

- the machine shuts down immediately upon opening the safety guard or
- the stop time (the time between the triggering of the stop command by the interlocking device and the point of no further risk from hazardous machine function) is shorter than the access time.

In the case of these safety switches, there are a number of different operating principles:

- Mechanical safety switches, e.g. EUCHNER safety switches series NZ, NP and NM
- Non-contact safety switches based on transponder technology, e.g. EUCHNER safety switches series CES
- Non-contact safety switches based on a magnetically coded principle, e.g. EUCHNER safety switches series CMS

Non-contact safety switches are interlocking devices that 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 heavy vibration
- a high safety category is stipulated during the risk analysis

EUCHNER safety switches CMS are based on the magnetic principle.
The tamper-proof coded system was specifically developed to monitor moving machine components and movable safety guards.

The safety switch CMS... offers important advantages

- Non-contact safety guard monitoring
  - No mechanical wear on the sensor units
- Long mechanical life (100 million operating cycles) of the reed contacts
- The coding for all the actuators in a series is identical
  - Quick replacement if required
- Evaluation units permit connection of various versions of actuators and read heads (whether rectangular or cylindrical)
- Actuator and read head have high degree of protection IP 67
- The actuator and read head can be fitted behind stainless steel
- Problem-free operation under extreme environmental conditions, e.g. dirt and moisture
- Actuator and read head have a wide operating distance and a broad hysteresis
- The sensor units can be actuated from different directions

Product overview

Evaluation unit CMS-E-AR

Design A Page 14

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Evaluation unit CMS-E-BR

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Functional description

The **C**oded **M**agnetic **S**afety switches **CMS** comprise three components:

- Actuator
- Read head
- Evaluation unit

Several permanent magnets are arranged in the *actuator* housing. The number of magnets, their position (polarization) in the housing and the magnetic field strength characterize the actuator type. For this reason they are also called coded actuators.

Within a series, the individual actuator coding is identical. Using one actuator type on a machine or complete system allows for quick and easy replacement.

Reed contacts are installed in the *read head* of the safety switch CMS.
The operating principle for the reed contacts (NC contacts or NO contacts), the number of reed contacts fitted and their physical arrangement determine the type of read head.
The contacts blades on the reed contacts will close when under the influence of the magnetic field from the actuator.

The actuators and read heads are matched in pairs and are available in 4 different housings.
Depending on the application, the system operator can select a rectangular or cylindrical design.
The read head only responds to the specific mating component, that is a specific actuator is allocated to the read head type. The same applies to the allocation of the read head to the evaluation unit (see product overview on page 5).

The *evaluation unit* is the system unit downstream from the read head. Using internal relays, it switches the safety circuit as a function of the position of the reed contacts.
The evaluation unit in degree of protection IP 20 is mounted in the control cabinet.

EUCHNER offers various evaluation units. The unit is selected as a function of the number of read heads to be connected and the overall system safety category to be achieved. The related evaluation units are described in detail in the following chapters.

In order to achieve a particular safety level, fault analyses must be carried out where safety-related components are used.
A fault could be caused by a short circuit in the connecting lead or by welding of a reed contact in the closed position. If a reed contact is welded, the magnetic force might not be strong enough to open the contact. For reasons of safety, several reed contacts (2 or 3, depending on the switch type) are fitted to each read head.
The NC contact/NO contact combination is used as an example. If the actuator is moved into the read head's operating distance, the reed contacts are switched by the magnets (in the actuator). Magnets with different polarization are assigned to the NC and NO contacts. The downstream evaluation unit monitors the read head: the NC/NO contacts in the read head must always have opposite states.
If this is not the case, the safety outputs of the evaluation units are not switched and the unit switches to the blocked state.

The read head is fastened to the fixed part of the safety guard and is connected to the evaluation unit using a two-core or four-core cable.
When the safety guard is closed, the actuator is moved towards the read head. As soon as there is an actuator in the operating distance (i.e. the switch-on distance s_{on} is reached) the reed contacts in the read head switch, i.e. they change their contact position.
If the evaluation unit detects that the reed contacts are in specific position on all read heads connected, i.e. all actuators are in the operating distance, the safety output is switched on.

If the actuator is moved away from the read head, the magnetic field around the reed contacts is reduced as a function of the distance. When the switch-off distance s_{off} is reached, the reed contacts return to their pre-loaded position (home position). They switch over to the non-actuated state.

The sensitivity of the reed contacts and the field strength of the magnets determine the switching distance between the actuator and the read head. Diagrams of the typical operating distances of the individual sensor units are shown in the technical data for the actuators and read heads. The illustration of the operating distance in x, y and z directions provides the user with information on how the actuator and read head must be positioned. When ideally positioned, the read head is in the middle of the operating distance. Slots are provided for actuator and read head adjustment.
The table of combination options (see pages 8 and 22) shows that the actuator and read head sensor units have a large operating distance. The advantage of this fact is that the door clearance setting may vary within the limits of the operating distance.
The safety switches CMS have switching characteristics with hysteresis ($s_{off} > s_{on}$).
If the read head is adjusted just inside the actuator's s_{on} operating distance, the plant will not be switched off immediately if the door vibrates slightly.
The switch-on and switch-off distances shown in the table refer to the approach of the sensor unit in the x direction (frontal approach direction). If the actuator approaches the read head from the side, the switching distances are likely to be reduced.

The magnetic switches are notable for their high degree of protection and compact design. They are therefore particularly suitable for areas where dirt and cleaning are major factors.

A major advantage of the EUCHNER safety switch CMS is that the actuator and read head can be fitted behind stainless steel. The switching distances are reduced in line with the material and wall thickness.
This property makes it possible to use the switch in the food industry in particular.
Installation using the corrosion-resistant safety screws (supplied) provides tamper-proof mounting of the actuator and read head on the safety guard.

Non-contact safety switch CMS-E-AR

- **2 read heads can be connected (NO contacts wired in parallel, safety category 3)**
- **30 read heads can be connected (NO contacts wired in series, safety category 2)**

Functional description

The evaluation unit CMS-E-AR is used to monitor safety guards in safety category 2 or 3 according to IEC/EN 954-1.
Up to 30 read heads can be connected in series to the evaluation unit CMS-E-AR.

If the actuator is in the operating distance, the reed contacts in the read head are switched by the magnetic field and the NO contacts are closed. The evaluation unit CMS-E-AR processes the read head's NO contact signals.
Each of these three inputs is connected to coils of independently operating relays in the evaluation unit. The electrically separate relay contacts are connected in series so that when all actuators are in the read heads' operating distance, the safety circuit (terminal 13/14) is closed.
The presence of the read head in the actuator's operating distance is indicated by the two LEDs on the evaluation unit (see table LED displays). This indication is particularly useful during commissioning and if servicing is required.

If one safety guard is monitored, a read head with reed contacts wired in parallel must be used (see connection example 1, page 11).
A four-pin bridge (supplied with the evaluation unit) is to be connected for the second unused connection area. If a bridge has been fitted the related LED illuminates and stays on.
If the related actuator is moved into the read head's operating distance, the two LEDs are illuminated and safety output 13/14 is activated.

If two safety guards are monitored, read heads with reed contacts wire in parallel must also be used (see connection example 2, page 11).

If three or more read heads are connected, the area most frequently accessed must be monitored by a read head with reed contacts wired in parallel. All further read heads, with reed contacts wired in series internally, must be connected in series (see connection example 3, page 11).
The three-pin bridge supplied with the unit must be used for any unused terminals.

From a safety analysis perspective, the three connection examples may be considered as follows:

- On the use of read heads with reed contacts wired in series, the system can achieve safety category 2 with TUV Süd approval.
- On the use of read heads with reed contacts wired in parallel, the system can achieve safety category 3 with TUV Süd approval.

LED displays

Function	LED	Color	State
Operating voltage	U_B	Green	On
Read head 1			
Actuator in operating distance	D1	Green	On
Actuator not in operating distance	D1	Green	Off
Read head 2			
Actuator in operating distance	D2	Green	On
Actuator not in operating distance	D2	Green	Off

- If the actuators are in the operating distance of the two connected read heads (or one read head and one 4-pin bridge), safety output 13/14 is activated. LEDs D1 and D2 illuminate.
- If the 4-pin bridge is used, the related green LED D1 or D2 illuminates and stays on.

Combination options Evaluation unit CMS-E-AR

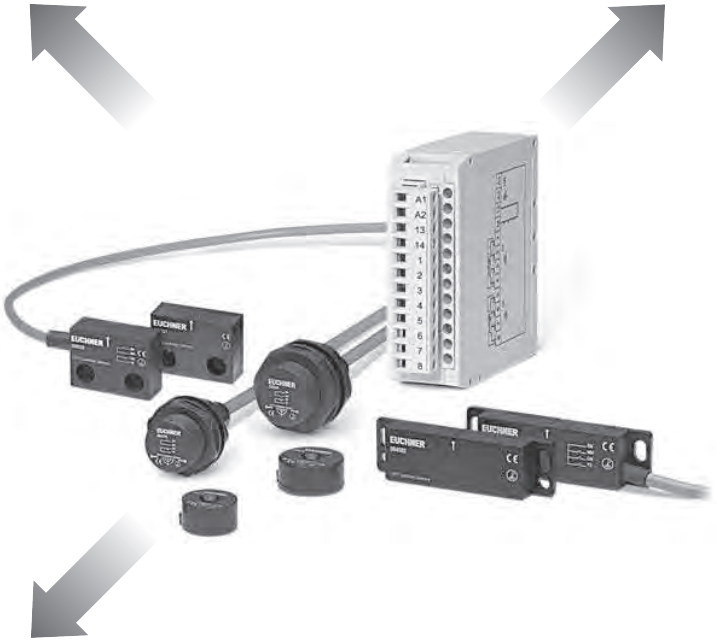
Design	Read head	Circuit diagram not actuated	Actuator	Minimum switch-on distance S_{on} [mm] 1)	Maximum switch-off distance S_{off} [mm]	Max. reset distance [mm]
	CMS-R-AXD		CMS-M-AB	6	14	-
	CMS-R-AXE		CMS-M-AG	18	30	-
	CMS-R-AXF		CMS-M-AB	6	14	-
	CMS-R-AXG		CMS-M-AG	18	30	-
	CMS-R-AXR		CMS-M-AI	9 (7) 3)	17 (15) 3)	-
	CMS-R-BXO		CMS-M-BH	7	10	-
	CMS-R-BXP					
M25 	CMS-R-CXA		CMS-M-CA	7	13	-
	CMS-R-CXB					
M30 	CMS-R-EXL		CMS-M-EF	7	13	-
	CMS-R-EXN					

1) There must be no ferromagnetic material in the vicinity of the read head or the actuator. All the data refers to the frontal approach direction and a center offset of m = 0.
2) The LED indicator for the auxiliary contact has an internal series resistor.
3) Operating distance for auxiliary contact and LED.

The EUCHNER evaluation unit CMS-E-AR with actuator and read head offers important advantages

- Up to 30 read heads can be connected to the evaluation unit
- Plug-in connection terminal block
- DIN rail according to EN 50022 ensures ease of mounting in the control cabinet
- Suitable for connection to a safe control system with or without clock signals
- LED displays
  - Ease of servicing in the case of faults
- High level of overall system safety in the case of:
  - Read heads with reed contacts wired in series (safety category 2 in acc. with IEC/EN 954-1)
  - Read heads with reed contacts wired in parallel (safety category 3 in acc. with IEC/EN 954-1)
- Approvals: TÜV and UL

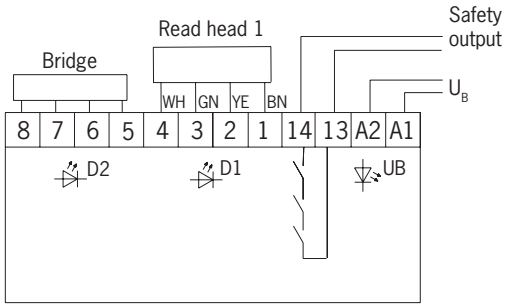
Connection examples evaluation unit CMS-E-AR with actuator and read head



Connection examples CMS-E-AR

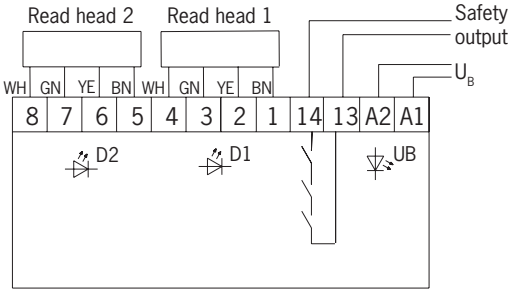
▸ Connection example 1

One read head on one evaluation unit CMS-E-AR
Read head 1: reed contacts wired in parallel



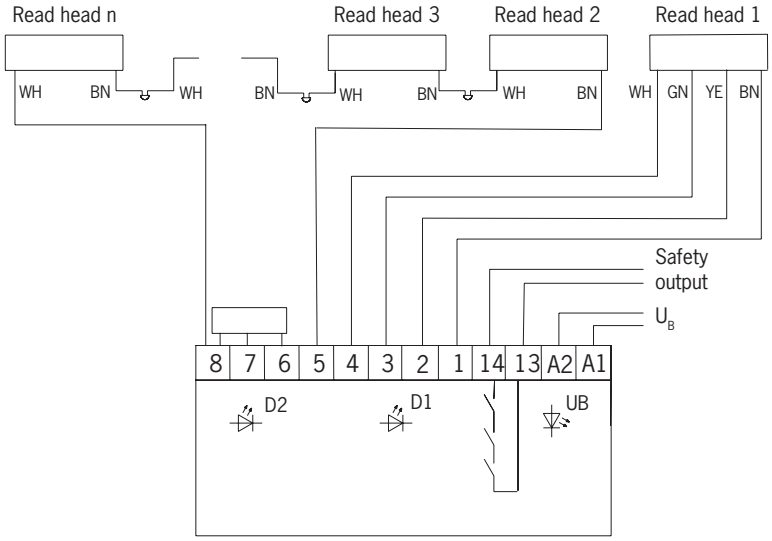
▸ Connection example 2

Two read heads on one evaluation unit CMS-E-AR
Read head 1 and 2: reed contacts wired in parallel



▸ Connection example 3

More than two read heads (max. of 30) on one evaluation unit CMS-E-AR
Read head 1: reed contacts wired in parallel; read head 2 ... n: reed contacts wired in series



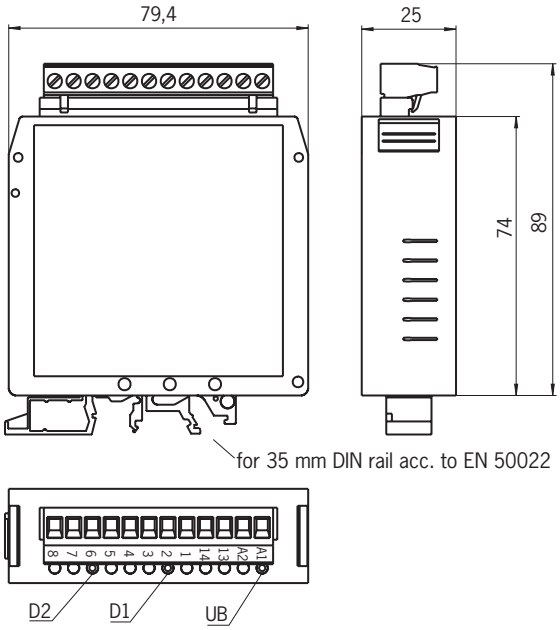
Notes

The following applies to all the illustrations:
Evaluation unit electrically isolated, actuator not in the operating distance.

Evaluation unit CMS-E-AR

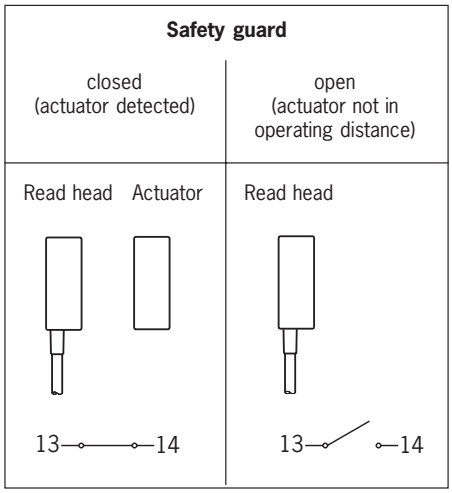
- **2 read heads can be connected (NO contacts wired in parallel, safety category 3)**
- **30 read heads can be connected (NO contacts wired in series, safety category 2)**

Dimension drawing



Switching characteristics

1 safety output 13/14 (relay output)



Notes on installation

The evaluation unit must be mounted in a control cabinet with a minimum degree of protection of IP 54. A snap-in element on the back of the evaluation unit is used for fastening to the DIN rail (35 mm DIN rail).

Notes on the electrical connection

- All the electrical inputs must either be isolated from the electricity supply by a safety isolating transformer in accordance with IEC/EN 60742 with limited output voltage in the event of a fault or by another equivalent isolation mechanism.
- Terminals A1 and A2 for the connection of the power supply and safety output are reverse polarity protected.
- External contact fuses (4 A quick blow fuse) must be fitted for relay outputs.
- All the output contacts must have an adequate protective circuit for capacitive and inductive loads.
- If a common power supply is used, all the inductive and capacitive loads (e.g. contactors) connected to the power supply must be connected with appropriate interference suppression units.
- If no read heads are connected to the plug-in terminals provided in the evaluation units, the bridges supplied must be inserted in accordance with the wiring diagram.

Safety precautions

- When monitoring **one** or **two** safety guards (one read head each), read heads with reed contacts wired in parallel, e.g. CMS-R-AXD, must be used.
- When connecting **three** or **more** read heads (up to 30), the area most frequently accessed must be monitored with a read head with reed contacts wired in parallel. All other read heads must have reed contacts wired in series, e.g. CMS-R-AXF.

Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Polyamide PA6.6			
Dimensions	89 x 79.4 x 25			mm
Weight	0.12			kg
Ambient temperature	0	-	+50	°C
Storage temperature	-25	-	+70	°C
Degree of protection to IEC/EN 60529	Terminals IP20 / Housing IP40			
Degree of contamination	2			
Mounting	35 mm DIN rail acc. to EN 50022			
Number of read heads	1 ... 30 serial [1] / 2 parallel			
Connection type	Plug-in screw terminals			
Operating voltage U_B	24 ±10%			AC/DC V
External fuse (operating voltage)	0.25 slow blow	-	1.5 quick blow	A
Switching voltage $U_{max.}$	250			AC V
Typ. current consumption	45			mA
Switching current $I_{max.}$ at 24 V	4			A
Switching current $I_{min.}$ at 24 V	13			mA
Breaking capacity $P_{max.}$	1,000			VA
External fuse (relay output)	4			A
Safety outputs	1			
Auxiliary contacts	-			
Utilization category according to IEC/EN 60947-5-2	AC-1 4A 250V / AC-15 1A 250V AC-1 4A 24V / AC-15 1A 24V DC-13 5A 24V			
Safety category acc. to IEC/EN 954-1	2 [2] / 3 [3]			
Classification according to IEC/EN 60947-5-3	PDF-S [4]			
Rated insulation voltage U_i	250			V
Vibration resistance	As per IEC/EN 60947-5-2			
Mechanical operating cycles relays	10 x 10^6			
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			

1) For 3 m cable lengths. The number depends on the cable length.
2) Safety category 2 in the case of read heads with reed contacts wired in series. Machine control system is responsible for checking the safety function at suitable intervals.
3) Safety category 3 in the case of read heads with reed contacts wired in parallel.
4) PDF-T in the case of reed contacts wired in series.

Ordering table

Item	Items supplied	Order No.
CMS-E-AR	1 pluggable bridge 3-pin 1 pluggable bridge, 4-pin	085 536

Read head series **CMS-R-AXD..., CMS-R-AXE..., CMS-R-AXF..., CMS-R-AXG..., CMS-R-AXR...**

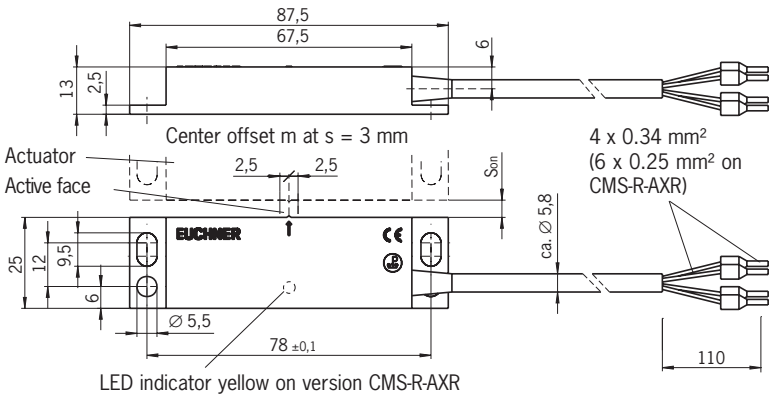
Actuator series **CMS-M-AB, CMS-M-AG, CMS-M-AI**

1) not for CMS-R-AXR

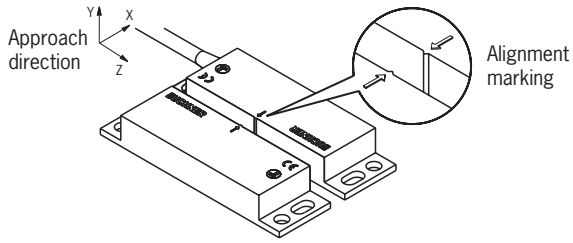
- **In combination with evaluation unit CMS-E-AR**
- **Design A**
- **Rectangular version 88 x 25 mm**

Dimension drawing

The dimensions of the actuators are the same as those of the read heads, although the former have no connection cable.



Alignment of read head and actuator



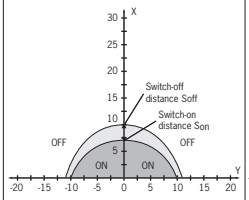
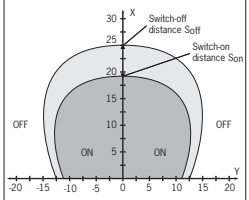
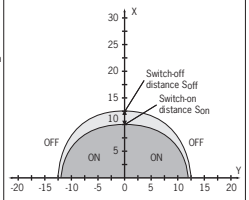
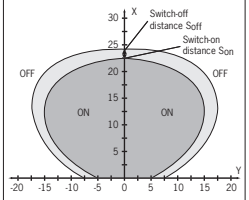
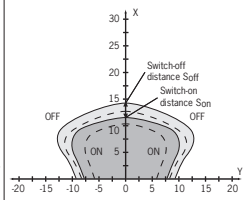
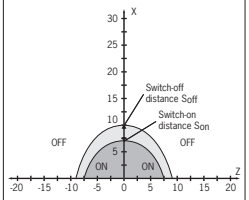
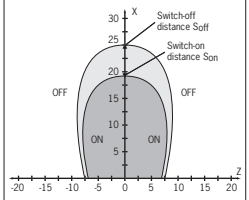
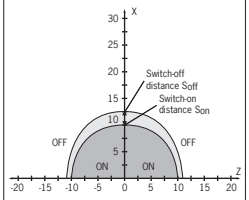
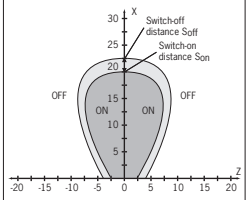
Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active faces on the read head and actuator areas must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

Technical data

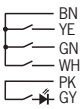
Parameters	Value			Unit
	min.	typ.	max.	
Housing material		Reinforced SPS		
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529		IP 67		
Installation position		Any, pay attention to alignment (markings)		
Read head connection type		Molded cable with crimped ferrules		
Switching voltage		24		V
Switching current I_e max.		0.5		A
Auxiliary contact (only CMS-A-AXR...)				
Switching voltage		24		V
Switching current I_e max.		0.01		A
Method of operation		Magnetic, reed contact		
Mech. life		100 x 10^6 operating cycles		
Vibration resistance		As per IEC/EN 60947-5-2		
Impact strength		50 (30 on CMS-R-AXR)		g/ms
Shock resistance		11		g/ms
EMC compliance		In acc. with EN 61496-1 / EN 50022 Part A		
Switch-on distance S_{on}		See operating distances and ordering table		
Switch-off distance S_{off}				
Read head switching elements				

Typical operating distances

Evaluation unit	CMS-E-AR combined with				
Read head	CMS-R-AXD...	CMS-R-AXE...	CMS-R-AXF...	CMS-R-AXG...	CMS-R-AXR...
Actuator	CMS-M-AB	CMS-M-AG	CMS-M-AB	CMS-M-AG	CMS-M-AI
Operating distance in the Y direction					
Operating distance in the Z direction					

Ordering table

Read heads (incl. 2 safety screws M4 x 14)

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-AXD-03V		6	3	**V** = PVC	084 583
CMS-R-AXD-05V			5		085 732
CMS-R-AXE-03V		18	3		084 584
CMS-R-AXE-05V			5		085 733
CMS-R-AXF-03V		6	3		084 585
CMS-R-AXF-05V			5		085 734
CMS-R-AXG-03V		18	3		084 586
CMS-R-AXG-05V			5		085 735
CMS-R-AXR-05VL		9 For auxiliary contact and LED: 7	5		093 975

Actuator (incl. 2 safety screws M4 x 14)

Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-AB	6	084 591
CMS-M-AG	18	085 654
CMS-M-AI	9	093 976

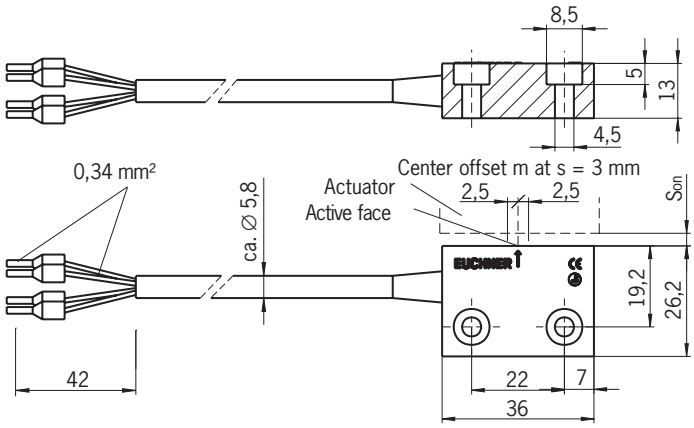
Read head series CMS-R-BXO..., CMS-R-BXP...

Actuator series CMS-M-BH

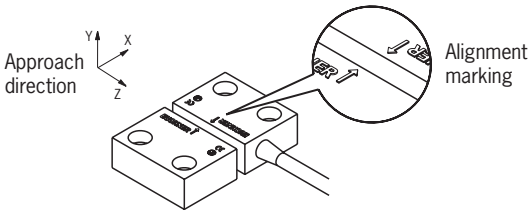
- **In combination with evaluation unit CMS-E-AR**
- **Design B**
- **Rectangular version 36 x 26 mm**

Dimension drawing

The dimensions of the actuators are the same as those of the read heads, although the former have no connection cable.



Alignment of read head and actuator



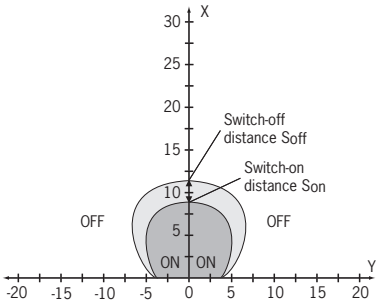
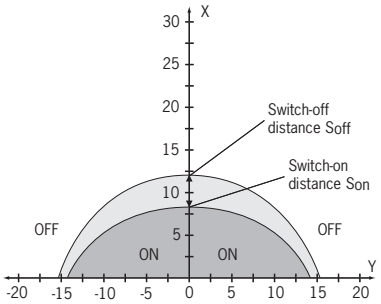
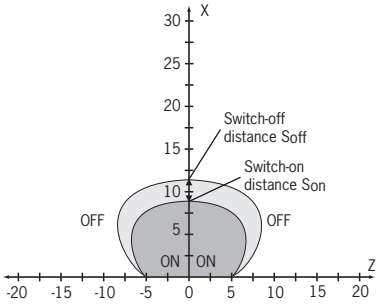
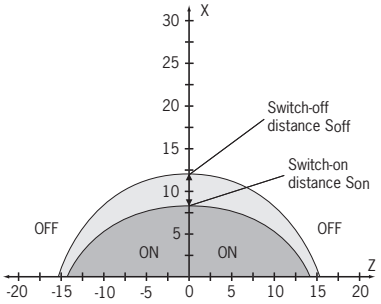
Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced SPS			
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529	IP 67			
Installation position	Any, pay attention to alignment (markings)			
Read head connection type	Molded cable with crimped ferrules			
Switching voltage	24			V
Switching current I_e max.	0.5			A
Method of operation	Magnetic, reed contact			
Mech. life	100 x 10^6 operating cycles			
Vibration resistance	As per IEC/EN 60947-5-2			
Impact strength	50			g/ms
Shock resistance	11			g/ms
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			
Switch-on distance S_{on}	See operating distances and ordering table			
Switch-off distance S_{off}				
Read head switching elements				

Typical operating distances

Evaluation unit	CMS-E-AR combined with	
Read head	CMS-R-BXO...	CMS-R-BXP...
Actuator	CMS-M-BH	CMS-M-BH
Operating distance in Y direction		
Operating distance in Z direction		

Ordering table

Read heads (incl. 2 safety screws M4 x 14)

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-BXO-05V		6	5	**V** = PVC	092 023
CMS-R-BXP-05V		6	5		092 024

Actuator (incl. 2 safety screws M4 x 14)

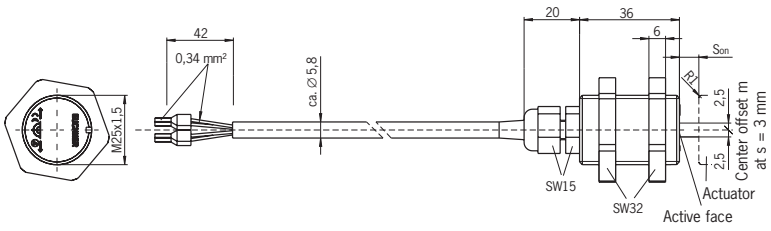
Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-BH	6	092 025

Read head series CMS-R-CXA..., CMS-R-CXB...

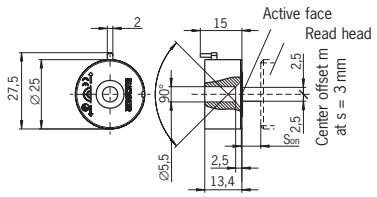
Actuator series CMS-M-CA

- **In combination with evaluation unit CMS-E-AR**
- **Design C**
- **Cylindrical version M25**

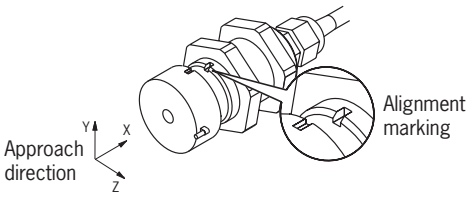
Dimension drawing for read head



Dimension drawing for actuator



Alignment of read head and actuator



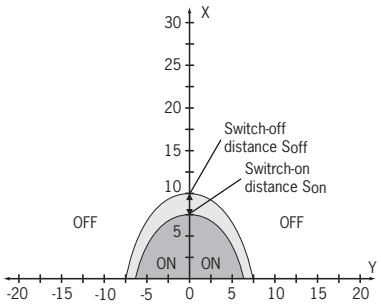
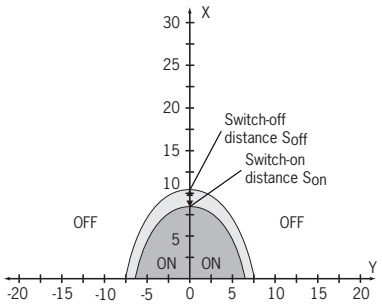
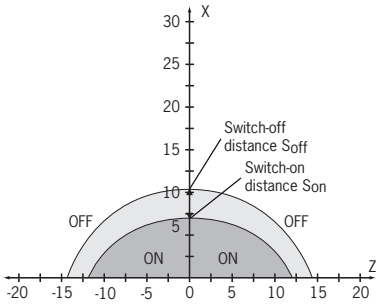
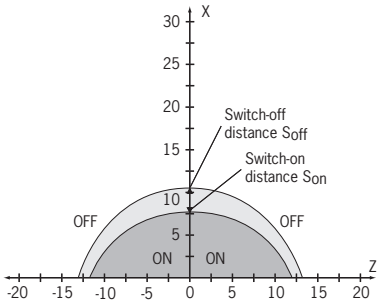
Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced SPS			
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529	IP 67			
Installation position	Any, pay attention to alignment (markings)			
Read head connection type	Molded cable with crimped ferrules			
Switching voltage	24			V
Switching current I_e max.	0.5			A
Method of operation	Magnetic, reed contact			
Mech. life	100 x 10^6 operating cycles			
Vibration resistance	As per IEC/EN 60947-5-2			
Impact strength	50			g/ms
Shock resistance	11			g/ms
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			
Switch-on distance S_{on}	See operating distances and ordering table			
Switch-off distance S_{off}				
Read head switching elements				

Typical operating distances

Evaluation unit	CMS-E-AR combined with	
Read head	CMS-R-CXA...	CMS-R-CXB...
Actuator	CMS-M-CA	CMS-M-CA
Operating distance in Y direction		
Operating distance in Z direction		

Ordering table

Read heads

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-CXA-03V		7	3	**V** = PVC	084 574
CMS-R-CXA-05V			5		085 739
CMS-R-CXB-03V		7	3		084 576
CMS-R-CXB-05V			5		085 740

Actuator (incl. 1 screw M5 x 25)

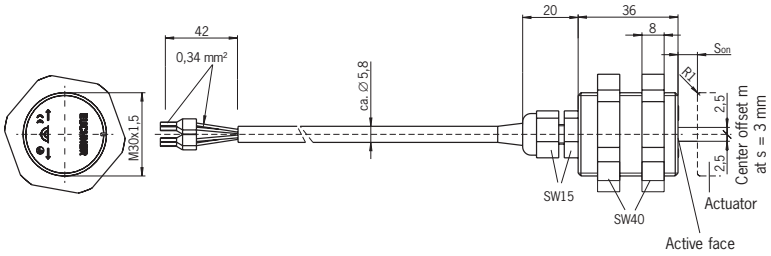
Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-CA	7	084 577

Read head series CMS-R-EXL..., CMS-R-EXN...

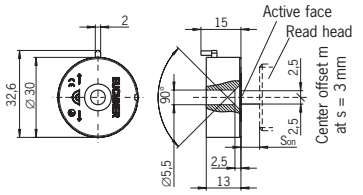
Actuator series CMS-M-EF

- **In combination with evaluation unit CMS-E-AR**
- **Design E**
- **Cylindrical version M30**

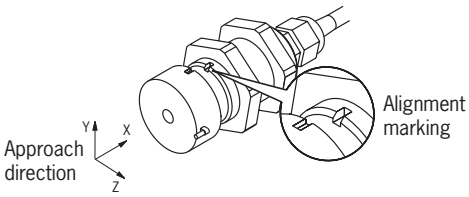
Dimension drawing for read head



Dimension drawing for actuator



Alignment of read head and actuator



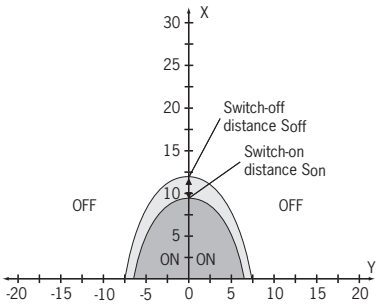
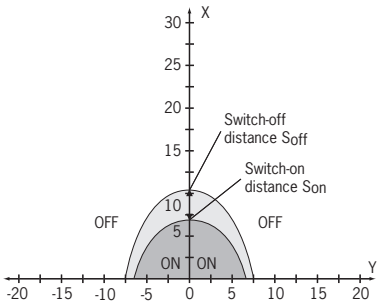
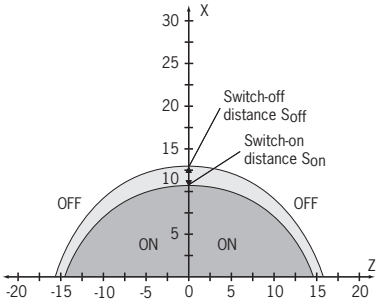
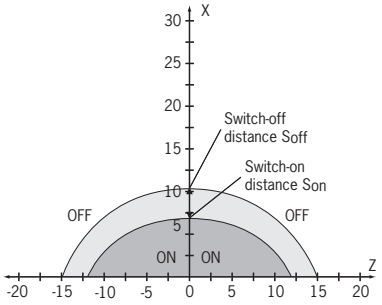
Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced SPS			
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529	IP 67			
Installation position	Any, pay attention to alignment (markings)			
Read head connection type	Molded cable with crimped ferrules			
Switching voltage	24			V
Switching current I_e max.	0.5			A
Method of operation	Magnetic, reed contact			
Mech. life	100 x 10^6 operating cycles			
Vibration resistance	As per IEC/EN 60947-5-2			
Impact strength	50			g/ms
Shock resistance	11			g/ms
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			
Switch-on distance S_{on}	See operating distances and ordering table			
Switch-off distance S_{off}				
Read head switching elements				

Typical operating distances

Evaluation unit	CMS-E-AR combined with	
Read head	CMS-R-EXL...	CMS-R-EXN...
Actuator	CMS-M-EF	CMS-M-EF
Operating distance in Y direction		
Operating distance in Z direction		

Ordering table

Read heads

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-EXL-03V		7	3	**V** = PVC	085 633
CMS-R-EXL-05V			5		085 742
CMS-R-EXN-03V		7	3		085 635
CMS-R-EXN-05V			5		085 744

Actuator (incl. 1 screw M5 x 25)

Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-EF	7	085 636

Non-contact safety switches CMS-E-BR

- **4 read heads can be connected (safety category 3)**
- **1 safety output**
- **1 auxiliary contact**
- **1 feedback loop can be connected**

Functional description

The evaluation unit CMS-E-BR is used for monitoring one to four guards in safety category 3 according to IEC/EN 954-1.
The related read heads for the evaluation unit have electrically separate reed contacts each of which has one NC contact and one NO contact (see connection examples on page 23).
If the actuator is in the operating distance, the reed contacts in the read head are switched by the magnetic field. The switching status of the reed contact is displayed on the evaluation unit's LEDs (see table LED displays).
Due to the NC/NO contact combination in the read head, the evaluation unit expects to receive antivalent signal changes.
If the actuators for all the read heads connected are in the operating distance, safety output 13/14 is closed.
An auxiliary contact 23/24, which is electrically separate from the safety output, is also available to the user. The auxiliary contact can be connected to a PLC for visual display.
If an input to the evaluation unit does not have a read head connected, the bridges supplied must be inserted in the unused input terminals according to the wiring diagram.
If motor contactors are used, the switching contacts can be monitored by the evaluation unit via positively driven NC contacts. For this purpose, the CMS-E-BR offers an appropriate Y1/Y2 connection for the feedback loop.
In the case of a *monitored feedback loop*, safety output 13/14 is only activated if feedback loop Y1/Y2 was closed before the actuator was moved into the read head's operating distance. A start button must not be incorporated into the feedback loop.
In the case of *unmonitored feedback loops*, the 2-pin bridge supplied with the evaluation unit must be connected to terminals Y1/Y2.
When the actuator is moved into the read head's operating distance, the entire unit is checked by the evaluation unit for faults.
If, in the case of lateral approach direction Z, the actuator is moved slowly up to the read head, the two reed contacts are not switched simultaneously. If, after a certain delay time, the second reed contact has not switched, the evaluation unit switches over to the blocked state. To cancel the blocked state, the actuator must again be moved outside the reset distance. As a certain delay time must be observed, the actuator has a minimum actuation speed in the case of the lateral approach direction.
This switching principle ensures that faults such as welding of contacts and broken cable connections will be reliably detected.
When the actuator is moved out of the operating distance the reset distance (see table Combination options) must be exceeded to ensure that safety output 13/14 and auxiliary contact 23/24 switch if the actuator is again moved to switch-on distance S_{on}.
The CMS-E-BR is a self-monitoring system unit. Faults or short circuits in the read head or internal faults in the evaluation unit will be detected and the safety circuit will be reliably switched off. Internal linking of the relay in the evaluation unit prevents the machine starting up in the event of a fault.

LED displays

Function	LED	Color	State
Operating voltage	U_B	Green	On
Outputs 23/24 and	OUT	Red	On
13/14 open	OUT	Green	Off
Outputs 23/24 and	OUT	Red	Off
13/14 closed	OUT	Green	On
Read head x (x = 1...4)			
Actuator **in the** operating distance			
▸NC contact in the read head is open	Dx1	Green	On
▸NO contact in the read head is closed	Dx2	Red	Off
Actuator **not in the** operating distance			
▸NC contact in the read head is closed	Dx1	Green	Off
▸NO contact in the read head is open	Dx2	Red	On

- If the green and red LEDs light up simultaneously (e.g. D11 and D22), the related actuator is not fully in the operating distance.
- If the actuators for all the connected read heads are in the operating distance (or 2-pin bridges have been fitted in the evaluation unit), safety output 13/14 and auxiliary contact 23/24 are activated (the green OUT LED illuminates).
- In the evaluation unit the green LEDs are wired in series in the following sequence: D11 - D21 - D31 - D41. This means that the green LED (e.g. D41) can only illuminate if the upstream LEDs D11/D21/D31 are also illuminated.
- If the actuation speed falls below the minimum speed, outputs 13/14 and 23/24 remain open.

Combination options Evaluation unit CMS-E-BR

Design	Read head	Circuit diagram not actuated	Actuator	Minimum switch-on distance S_{on} [mm] 1)	Maximum switch-off distance S_{off} [mm]	Max. reset distance [mm]
	CMS-R-AXH		CMS-M-AC	6	13	15
	CMS-R-BXI		CMS-M-BD	3	8	11
M25 	CMS-R-CXC		CMS-M-CA	6	13	14
M30 	CMS-R-EXM		CMS-M-EF	6	13	16

1) There must be no ferromagnetic material in the vicinity of the read head or the actuator. All the data refers to the frontal approach direction and a center offset of m = 0.

The EUCHNER evaluation unit CMS-E-BR with actuator and read head offers important advantages

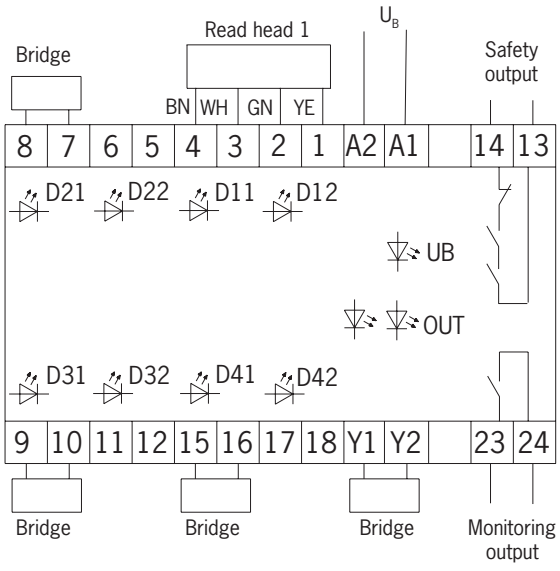
- Up to 4 read heads can be connected to the evaluation unit
- Auxiliary contact fitted
  - Control system can poll the state of the safety guard
- Feedback loop available
  - Downstream contactor can be monitored
- DIN rail according to EN 50022 ensures ease of assembly in the control cabinet
- Plug-in connection terminal blocks
- Suitable for connection to a safe control system with or without clock signals
- Evaluation unit has LED displays
  - Servicing work is much easier
- Three internally monitored relays in the evaluation unit switch the safety circuit
  - Safety category 3 acc. to IEC/EN 954-1
- Approval: TÜV and UL

Notes

The following applies to all the illustrations:
Evaluation unit electrically isolated, actuator not in the operating distance.

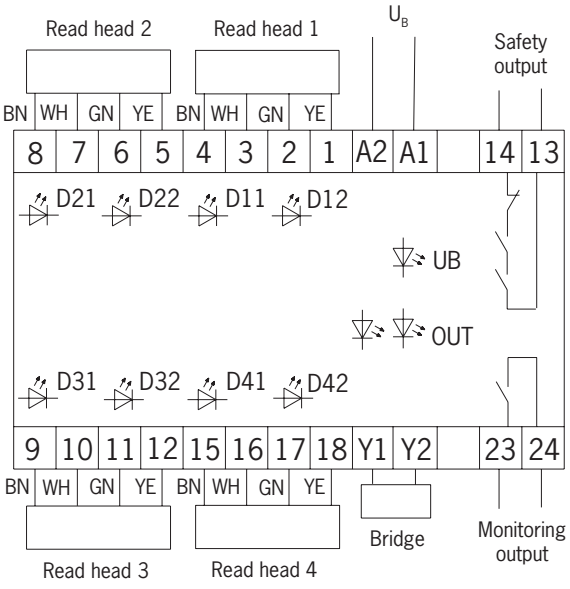
Connection example 1

One read head for one evaluation unit CMS-E-BR (without feedback loop)



Connection example 2

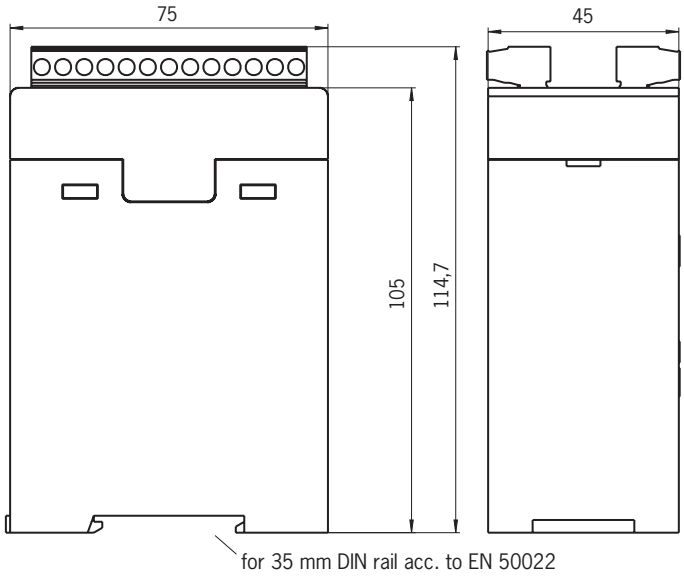
Four read heads for one evaluation unit CMS-E-BR (without feedback loop)

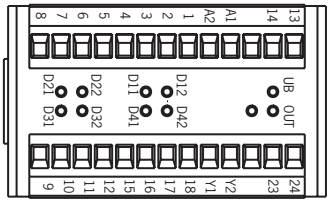


Evaluation unit CMS-E-BR

- **4 read heads can be connected (safety category 3)**
- **1 safety output**
- **1 auxiliary contact**
- **1 feedback loop can be connected**

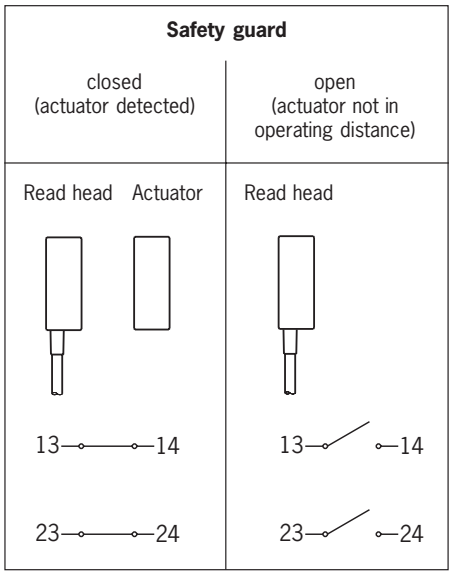
Dimension drawing





Switching characteristics

1 safety output 13/14 (relay output)
1 door monitoring contact 23/24 (relay output)



Notes on installation

The evaluation unit must be mounted in a control cabinet with a minimum degree of protection of IP 54. A snap-in element on the back of the evaluation unit is used for fastening to the DIN rail (35 mm DIN rail).

Notes on the electrical connection

- All the electrical inputs must either be isolated from the electricity supply by a safety isolating transformer in accordance with IEC/EN 60742 with limited output voltage in the event of a fault or by another equivalent isolating mechanism.
- Terminals A1 and A2 for connection of the power supply and all outputs (safety and auxiliary contact) are reverse polarity protected.
- External contact fuses (4 A quick blow fuse) for relay outputs must be fitted.
- All the output contacts must have an adequate protective circuit for capacitive and inductive loads.
- If a common power supply is used, all the inductive and capacitive loads (e.g. contactors) connected to the power supply must be connected to appropriate interference suppression units.
- If no read heads are connected to the plug-in terminals provided in the evaluation units, the bridges supplied must be inserted in accordance with the wiring diagram.

Safety precautions

- Door monitoring contact 23/24 for the evaluation unit CMS-E-BR must not be used as a safety output.
- In the case of a monitored feedback loop, safety output 13/14 is only activated if feedback loop Y1/Y2 was closed before the actuator was moved into the read head's operating distance.
- A start button must not be incorporated into the feedback loop.
- In the case of unmonitored feedback loops, the 2-pin bridge supplied with the evaluation unit must be connected to terminals Y1/Y2.
- Note on achieving safety category 3: not all faults are detected. An accumulation of undetected faults can result in the loss of the safety function. In this application it must therefore be ensured that only one safety door is opened, or that the state of each safety door is checked at suitable intervals.

Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material		ABS		
Dimensions		114.7 x 75 x 45		mm
Weight		0.24		kg
Ambient temperature	0	-	+50	°C
Storage temperature	-25	-	+70	°C
Degree of protection to IEC/EN 60529		Terminals IP20 / Housing IP40		
Degree of contamination		2		
Mounting		35 mm DIN rail acc. to EN 50022		
Number of read heads		1 ... 4		
Connection type		Plug-in screw terminals		
Operating voltage U_B		24 ±10%		AC/DC V
External fuse (operating voltage)	0.5 slow blow	-	1.5 quick blow	A
Switching voltage $U_{max.}$		250		AC V
Typ. current consumption		100		mA
Switching current $I_{max.}$ at 24 V		4		A
Switching current $I_{min.}$ at 24 V		13		mA
Breaking capacity $P_{max.}$		750		VA
External fuse (relay outputs)		4		A
Safety outputs		1		
Auxiliary contacts		1		
Utilization category according to IEC/EN 60947-5-2		AC-1 4A 250V / AC-15 1A 250V AC-1 4A 24V / AC-15 1A 24V DC-13 5A 24V		
Safety category acc. to IEC/EN 954-1		3		
Classification according to IEC/EN 60947-5-3		PDF-S		
Rated insulation voltage U_i		250		V
Vibration resistance		As per IEC/EN 60947-5-2		
Mechanical operating cycles relays		30×10^6		
EMC compliance		In acc. with EN 61496-1 / EN 50022 Part A		

Ordering table

Item	Items supplied	Order No.
CMS-E-BR	4 pluggable bridges, 2-pin	085 537

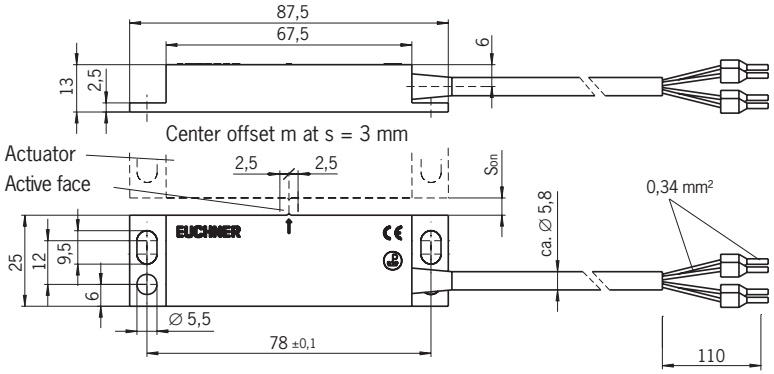
Read head series CMS-R-AXH...

Actuator series CMS-M-AC

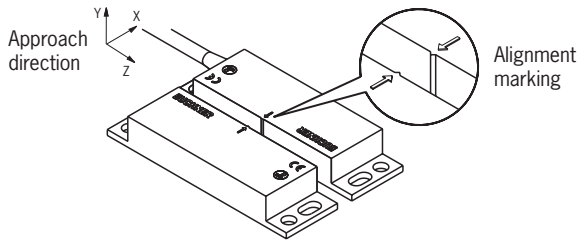
- **In combination with evaluation unit CMS-E-BR**
- **Design A**
- **Rectangular version 88 x 25 mm**

Dimension drawing

The dimensions of the actuators are the same as those of the read heads, although the former have no connection cable.



Alignment of read head and actuator



Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

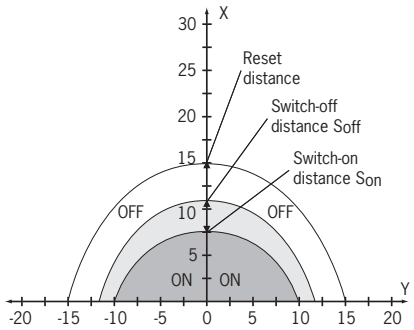
Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced SPS			
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529	IP 67			
Installation position	Any, pay attention to alignment (markings)			
Read head connection type	Molded cable with crimped ferrules			
Switching voltage	24			V
Switching current I_e max.	0.5			A
Method of operation	Magnetic, reed contact			
Mech. life	100 x 10^6 operating cycles			
Vibration resistance	As per IEC/EN 60947-5-2			
Impact strength	50			g/ms
Shock resistance	11			g/ms
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			
Switch-on distance S_{on}	See operating distances and ordering table			
Switch-off distance S_{off}				
Read head switching elements				

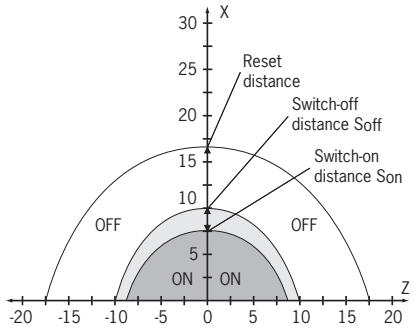
Typical operating distances

Evaluation unit	CMS-E-BR combined with
Read head	CMS-R-AXH...
Actuator	CMS-M-AC

Operating distance in Y direction



Operating distance in Z direction



Ordering table

Read heads (incl. 2 safety screws M4 x 14)

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-AXH-03V		6	3	**V** = PVC	084 587
CMS-R-AXH-05V			5		085 736

Actuator (incl. 2 safety screws M4 x 14)

Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-AC	6	084 592

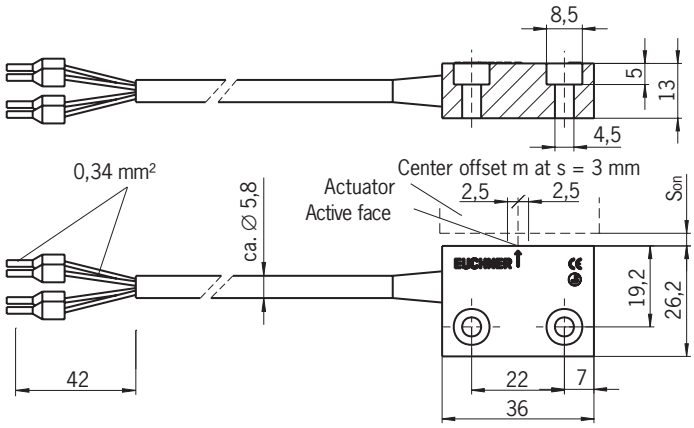
Read head series CMS-R-BXI...

Actuator series CMS-M-BD

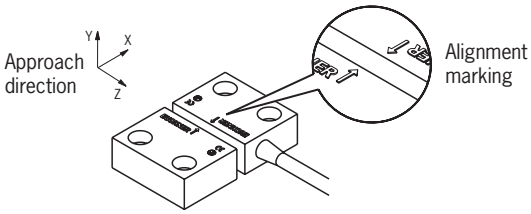
- **In combination with evaluation unit CMS-E-BR**
- **Design B**
- **Rectangular version 36 x 26 mm**

Dimension drawing

The dimensions of the actuators are the same as those of the read heads, although the former have no connection cable.



Alignment of read head and actuator



Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

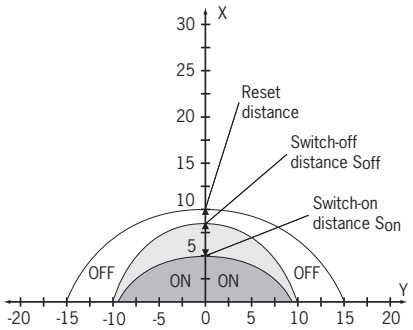
Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced SPS			
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529	IP 67			
Installation position	Any, pay attention to alignment (markings)			
Read head connection type	Molded cable with crimped ferrules			
Switching voltage	24			V
Switching current I_e max.	0.5			A
Method of operation	Magnetic, reed contact			
Mech. life	100 x 10^6 operating cycles			
Vibration resistance	As per IEC/EN 60947-5-2			
Impact strength	50			g/ms
Shock resistance	11			g/ms
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			
Switch-on distance S_{on}	See operating distances and ordering table			
Switch-off distance S_{off}				
Read head switching elements				

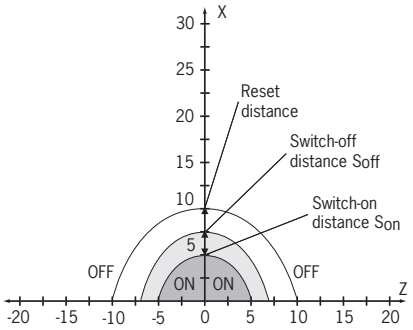
Typical operating distances

Evaluation unit	CMS-E-BR combined with
Read head	CMS-R-BXI...
Actuator	CMS-M-BD

Operating distance in Y direction



Operating distance in Z direction



Ordering table

Read heads (incl. 2 safety screws M4 x 14)

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-BXI-03V		3	3	**V** = PVC	085 530
CMS-R-BXI-05V			5		085 737

Actuator (incl. 2 safety screws M4 x 14)

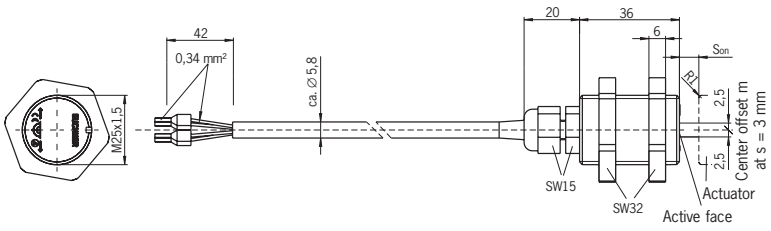
Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-BD	3	085 531

Read head series CMS-R-CXC...

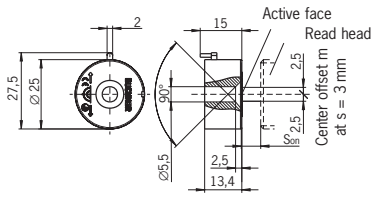
Actuator series CMS-M-CA

- **In combination with evaluation unit CMS-E-BR**
- **Design C**
- **Cylindrical version M25**

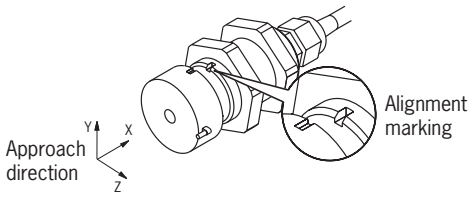
Dimension drawing for read head



Dimension drawing for actuator



Alignment of read head and actuator



Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

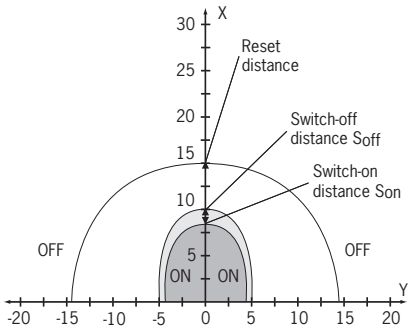
Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced SPS			
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529	IP 67			
Installation position	Any, pay attention to alignment (markings)			
Read head connection type	Molded cable with crimped ferrules			
Switching voltage	24			V
Switching current I_e max.	0.5			A
Method of operation	Magnetic, reed contact			
Mech. life	100 x 10^6 operating cycles			
Vibration resistance	As per IEC/EN 60947-5-2			
Impact strength	50			g/ms
Shock resistance	11			g/ms
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			
Switch-on distance S_{on}	See operating distances and ordering table			
Switch-off distance S_{off}				
Read head switching elements				

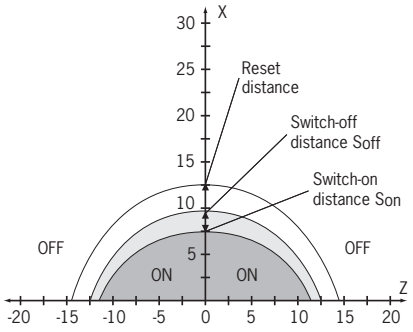
Typical operating distances

Evaluation unit	CMS-E-BR combined with
Read head	CMS-R-CXC...
Actuator	CMS-M-CA

Operating distance in Y direction



Operating distance in Z direction



Ordering table

Read heads

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-CXC-03V		6	3	**V** = PVC	084 575
CMS-R-CXC-05V			5		085 741

Actuator (incl. 1 screw M5 x 25)

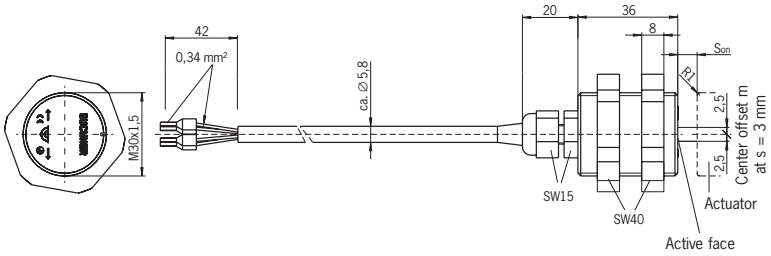
Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-CA	6	084 577

Read head series CMS-R-EXM...

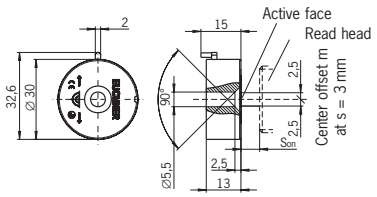
Actuator series CMS-M-EF

- **In combination with evaluation unit CMS-E-BR**
- **Design E**
- **Cylindrical version M30**

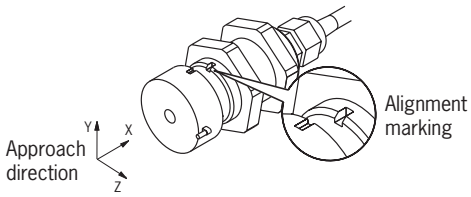
Dimension drawing for read head



Dimension drawing for actuator



Alignment of read head and actuator



Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

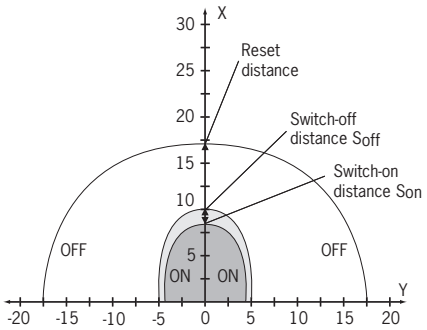
Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material		Reinforced SPS		
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529		IP 67		
Installation position		Any, pay attention to alignment (markings)		
Read head connection type		Molded cable with crimped ferrules		
Switching voltage		24		V
Switching current I_e max.		0.5		A
Method of operation		Magnetic, reed contact		
Mech. life		100 x 10^6 operating cycles		
Vibration resistance		As per IEC/EN 60947-5-2		
Impact strength		50		g/ms
Shock resistance		11		g/ms
EMC compliance		In acc. with EN 61496-1 / EN 50022 Part A		
Switch-on distance S_{on}		See operating distances and ordering table		
Switch-off distance S_{off}				
Read head switching elements				

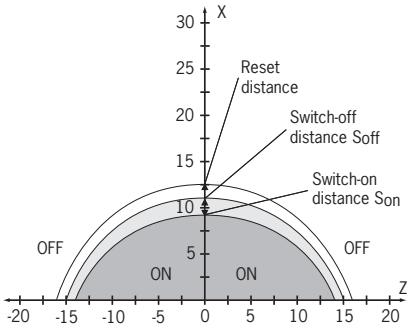
Typical operating distances

Evaluation unit	CMS-E-BR combined with
Read head	CMS-R-EXM...
Actuator	CMS-M-EF

Operating distance in Y direction



Operating distance in Z direction



Ordering table

Read heads

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-EXM-03V		6	3	**V** = PVC	085 634
CMS-R-EXM-05V			5		085 743

Actuator (incl. 1 screw M5 x 25)

Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-EF	6	085 636

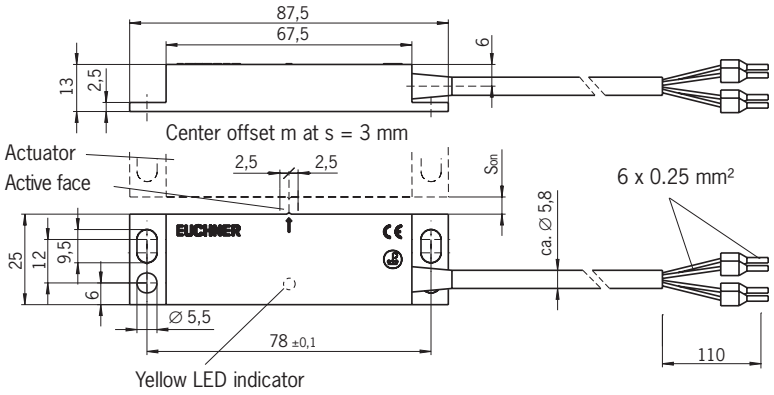
Read head series CMS-R-AZA...

Actuator series CMS-M-AI

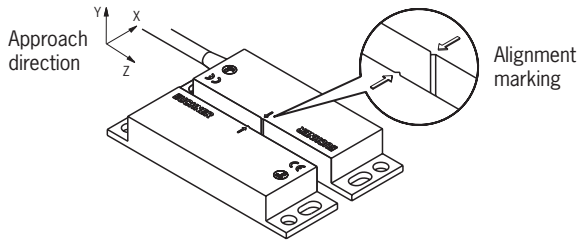
- **In combination with evaluation unit ESM-BA... / ESM-F-B...**
- **Design A**
- **Rectangular version 88 x 25 mm**

Dimension drawing

The dimensions of the actuators are the same as those of the read heads, although the former have no connection cable.



Alignment of read head and actuator



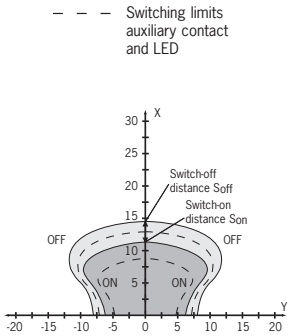
Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

Technical data

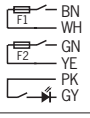
Parameters	Value			Unit
	min.	typ.	max.	
Housing material		Reinforced SPS		
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529		IP 67		
Installation position		Any, pay attention to alignment (markings)		
Read head connection type		Molded cable with crimped ferrules		
Switching voltage		24		V
Switching current I_e max.		0.1		A
Built-in fuse (per safety contact)		100		mA
Auxiliary contact (only CMS-A-AXR...)				
Switching voltage		24		V
Switching current I_e max.		0.01		A
Method of operation		Magnetic, reed contact		
Mech. life		100 x 10^6 operating cycles		
Vibration resistance		As per IEC/EN 60947-5-2		
Impact strength		30 (50 for actuator)		g/ms
Shock resistance		11		g/ms
EMC compliance		In acc. with EN 61496-1 / EN 50022 Part A		
Switch-on distance S_{on}		See operating distances and ordering table		
Switch-off distance S_{off}				
Read head switching elements				

Typical operating distances

Evaluation unit	ESM-BA... in combination with
Read head	CMS-R-AZA...
Actuator	CMS-M-AI
Operating distance in Y direction	

Ordering table

Read heads

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-AZA-05VL		9	5	**V** = PVC	094 702
CMS-R-AZA-10VL		For auxiliary contact and LED: 7	10		095 558

Actuator (incl. 1 screw M5 x 25)

Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-AI	9	093 976

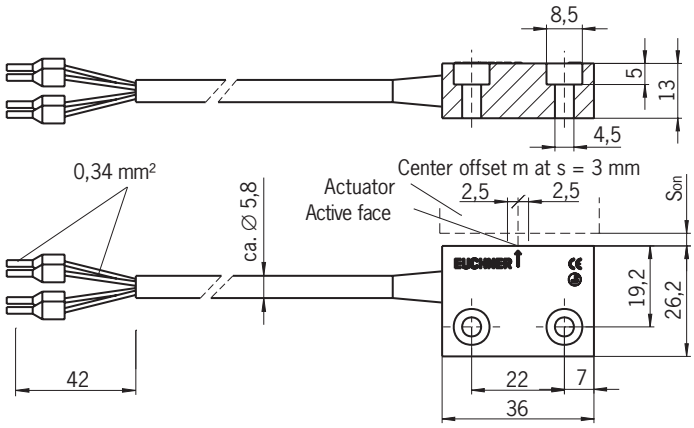
Read head series CMS-R-BZB...

Actuator series CMS-M-BH

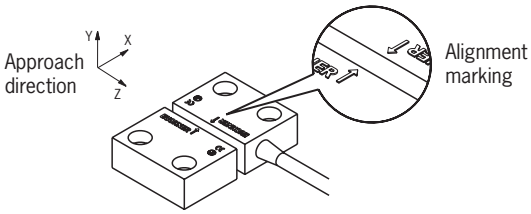
- **In combination with evaluation unit ESM-BA... / ESM-F-B...**
- **Design B**
- **Rectangular version 36 x 26 mm**

Dimension drawing

The dimensions of the actuators are the same as those of the read heads, although the former have no connection cable.



Alignment of read head and actuator



Notes on installation

- Read heads and actuators must not be used as a mechanical stop.
- Read heads and actuators must not be used in an environment with strong magnetic fields.
- Read heads and actuators must be positively mounted to the safety guard, e.g. by using the safety screws supplied.
- When the safety guard is closed, the active face on the read head and actuator must be exactly aligned.
- A guide and an extra stop must be fitted to the moveable part of the safety guard.
- In the closed position, a locking mechanism must be fitted to the safety doors.
- If the read head and actuator are fitted flush, the switching distance is reduced in line with the installation depth and the safety guard material.
- If the read head and actuator are fitted on ferromagnetic material, the read distance is reduced.

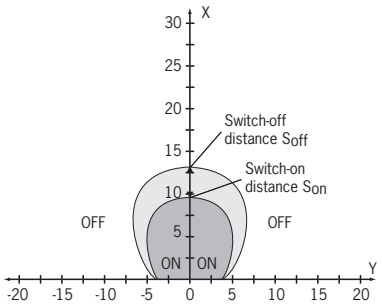
Technical data

Parameters	Value			Unit
	min.	typ.	max.	
Housing material	Reinforced SPS			
Ambient temperature	-20	-	+60	°C
Degree of protection to IEC/EN 60529	IP 67			
Installation position	Any, pay attention to alignment (markings)			
Read head connection type	Molded cable with crimped ferrules			
Switching voltage	24			V
Switching current I_e max.	0.1			A
Built-in fuse (per safety contact)	100			mA
Auxiliary contact				
Switching voltage	24			V
Switching current I_e max.	0.01			A
Method of operation	Magnetic, reed contact			
Mech. life	100 x 10^6 operating cycles			
Vibration resistance	As per IEC/EN 60947-5-2			
Impact strength	50			g/ms
Shock resistance	11			g/ms
EMC compliance	In acc. with EN 61496-1 / EN 50022 Part A			
Switch-on distance S_{on}	See operating distances and ordering table			
Switch-off distance S_{off}				
Read head switching elements				

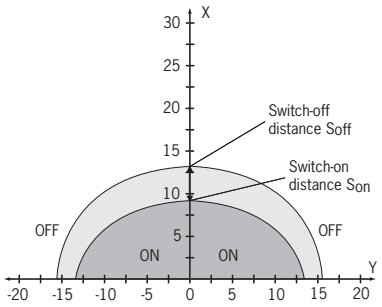
Typical operating distances

Evaluation unit	ESM-BA... in combination with
Read head	CMS-R-BZB...
Actuator	CMS-M-BH

Operating distance in Y direction



Operating distance in Z direction



Ordering table

Read heads

Item	Circuit diagram not actuated	Minimum switch-on distance S_{on} [mm]	Cable length [m]	Cable type	Order no.
CMS-R-BZB-03VL		9	3	**V** = PVC	097 368

Actuator (incl. 1 screw M5 x 25)

Item	For minimum switch-on distance S_{on} [mm]	Order No.
CMS-M-BH	9	092 025

Accessories

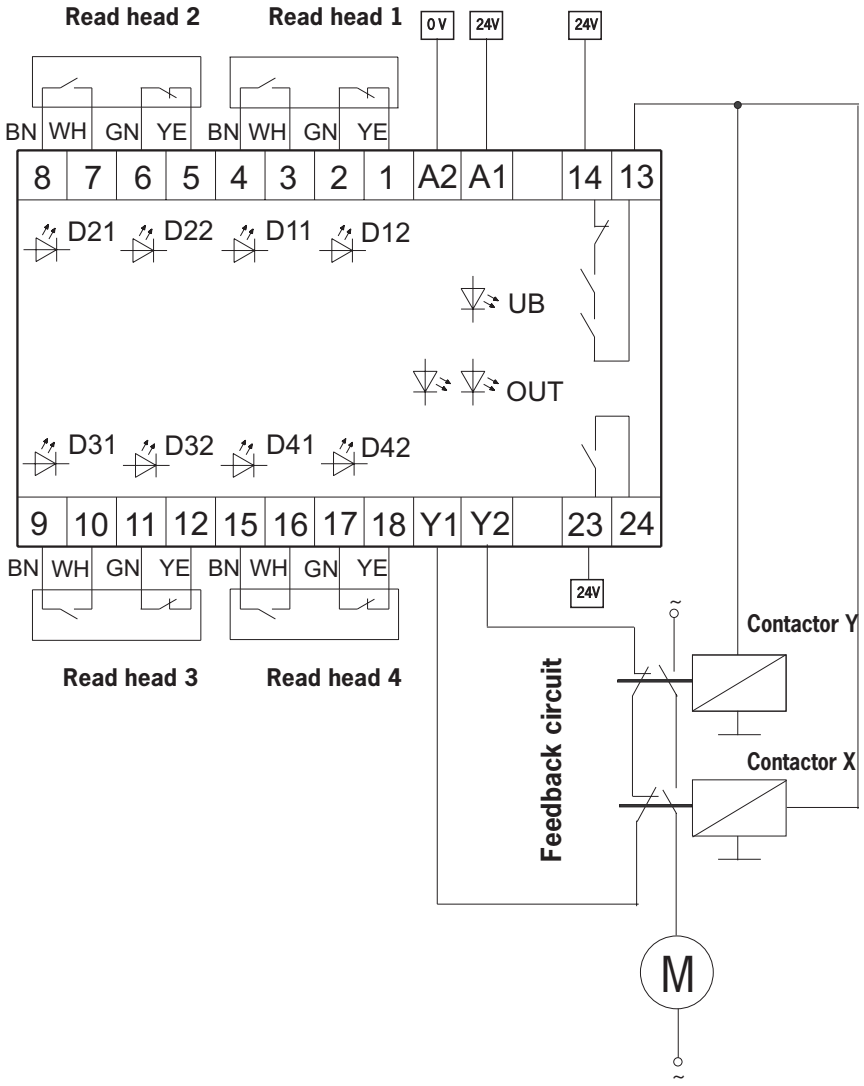
Pluggable bridges for evaluation units

For evaluation unit	Number of pins	Packaging unit	Type designation	Order No.
CMS-E-AR	3-pin	10 pieces	CMS-A-J3	085 666
CMS-E-AR	4-pin	10 pieces	CMS-A-J4	085 667
CMS-E-BR	2-pin	10 pieces	CMS-A-J2	085 665

Appendix

Connection example CMS-E-BR

- **Connection of 4 read heads**
- **Connection of 2 contactors with feedback loop**
- **Safety category 3**



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CMS-A-J3	085 666	38
CMS-A-J4	085 667	38
CMS-E-AR	085 536	12
CMS-E-BR	085 537	24
CMS-M-AB	084 591	14
CMS-M-AC	084 592	26
CMS-M-AG	085 654	14
CMS-M-AI	093 976	14/34
CMS-M-BD	085 531	28
CMS-M-BH	092 025	16/36
CMS-M-CA	084 577	18/30
CMS-M-EF	085 636	20/32
CMS-R-AXD-03V	084 583	14
CMS-R-AXD-05V	085 732	14
CMS-R-AXE-03V	084 584	14
CMS-R-AXE-05V	085 733	14
CMS-R-AXF-03V	084 585	14
CMS-R-AXF-05V	085 734	14
CMS-R-AXG-03V	084 586	14
CMS-R-AXG-05V	085 735	14
CMS-R-AXH-03V	084 587	26
CMS-R-AXH-05V	085 736	26
CMS-R-AXR-05VL	093 975	14
CMS-R-AZA-05VL	094 702	34
CMS-R-AZA-10VL	095 558	34
CMS-R-BXI-03V	085 530	28
CMS-R-BXI-05V	085 737	28
CMS-R-BXO-05V	092 023	16
CMS-R-BXP-05V	092 024	16
CMS-R-BZB-03VL	097 368	36
CMS-R-CXA-03V	084 574	18
CMS-R-CXA-05V	085 739	18
CMS-R-CXB-03V	084 576	18
CMS-R-CXB-05V	085 740	18
CMS-R-CXC-03V	084 575	30
CMS-R-CXC-05V	085 741	30
CMS-R-EXL-03V	085 633	20
CMS-R-EXL-05V	085 742	20
CMS-R-EXM-03V	085 634	32
CMS-R-EXM-05V	085 743	32
CMS-R-EXN-03V	085 635	20
CMS-R-EXN-05V	085 744	20

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084 577	CMS-M-CA	18/30
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084 584	CMS-R-AXE-03V	14
084 585	CMS-R-AXF-03V	14
084 586	CMS-R-AXG-03V	14
084 587	CMS-R-AXH-03V	26
084 591	CMS-M-AB	14
084 592	CMS-M-AC	26
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085 531	CMS-M-BD	28
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085 537	CMS-E-BR	24
085 633	CMS-R-EXL-03V	20
085 634	CMS-R-EXM-03V	32
085 635	CMS-R-EXN-03V	20
085 636	CMS-M-EF	20/32
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085 667	CMS-A-J4	38
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085 733	CMS-R-AXE-05V	14
085 734	CMS-R-AXF-05V	14
085 735	CMS-R-AXG-05V	14
085 736	CMS-R-AXH-05V	26
085 737	CMS-R-BXI-05V	28
085 739	CMS-R-CXA-05V	18
085 740	CMS-R-CXB-05V	18
085 741	CMS-R-CXC-05V	30
085 742	CMS-R-EXL-05V	20
085 743	CMS-R-EXM-05V	32
085 744	CMS-R-EXN-05V	20
092 023	CMS-R-BXO-05V	16
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093 975	CMS-R-AXR-05VL	14
093 976	CMS-M-AI	14/34
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095 558	CMS-R-AZA-10VL	34
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