

Read head CEM with guard locking without guard lock monitoring

- ▶ With transponder coding
- ▶ Integrated solenoid (without monitoring of the guard locking)
- ▶ 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 overtravelling 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 1000 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 $\pm 4^\circ$. 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 1000 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. Particularly for large, solid doors, an LED display close to the door handle is of advantage.

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.

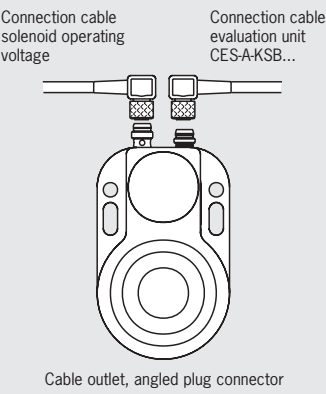
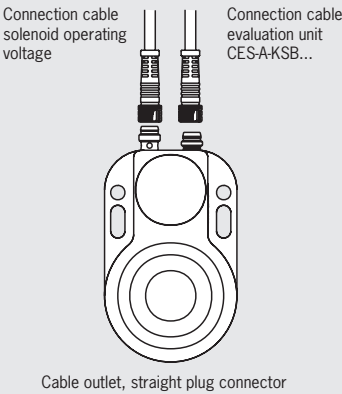
Adjustable adhesive force

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.

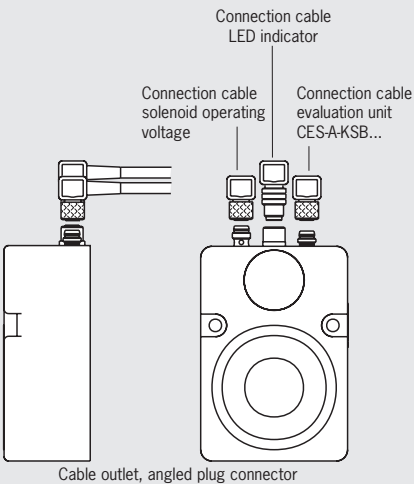
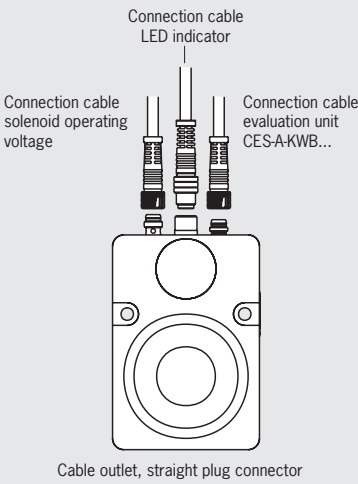
Your advantages

- ▶ 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 1000 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 employers' liability insurance association (DGUV) and UL (Canada and USA)

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



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



Read head CEM-A-LE05.../CEM-A-LE05...-EX



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



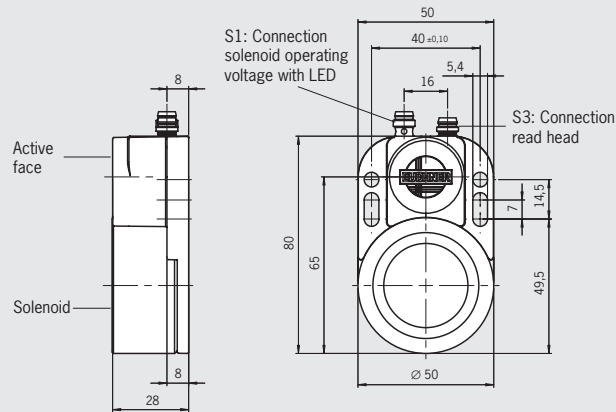
For possible combinations see page 24

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.

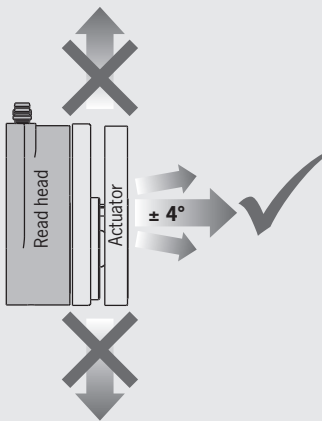
Read head CEM-A-LE05.../CEM-A-LE05...-EX

Dimension drawing



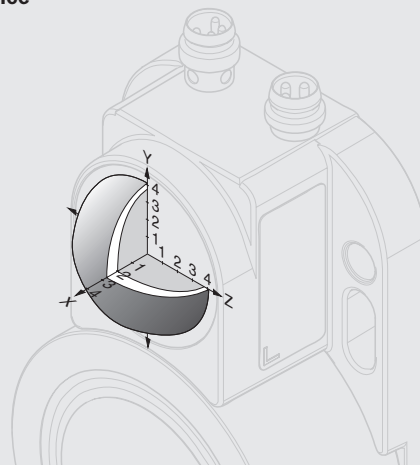
For connection cables see page 69/70

Approach direction



Typical operating distance

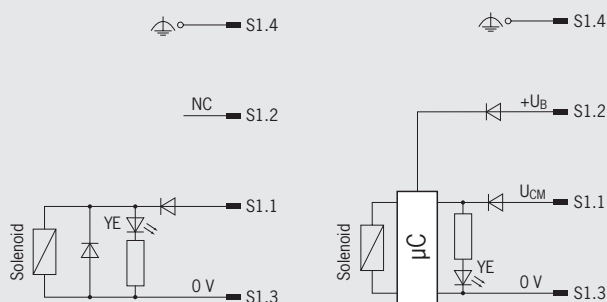
Safe switch-off distance
Note $s_{sw} = 20$ mm for internal component failure.
Safety outputs are safely switched off.



Wiring diagram

CEM-A-LE05K-S2

CEM-A-LE05R-S2

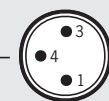


Circuit diagram connection solenoid operating voltage plug S1
A free-wheeling diode is already integrated into each CEM



Solenoid operating voltage

- S1.1 ▶ U_{CM} /DC 24 V
- S1.2 ▶ $+U_B$ /DC 24 V
- S1.3 ▶ 0 V/GND
- S1.4 ▶



Evaluation unit CES

- S3.1 ▶ Data wire
- S3.3 ▶ Data wire
- S3.4 ▶ SH (screen)

Ordering table

Series	Locking force [N]	Version	Order no / item
CEM-A-LE05K-S2	500	With remanence	094800 CEM-A-LE05K-S2
CEM-A-LE05K-S2-EX	500	ATEX, with remanence	097174 ¹⁾ CEM-A-LE05K-S2-EX
CEM-A-LE05R-S2	500	Without remanence	095792 CEM-A-LE05R-S2

1) EX II 3G Ex nA IIC T6

Technical data read head CEM-A-LE05.../CEM-A-LE05...-EX

Parameter	min.		Value typ.	max.	Unit
General					
Housing material	Aluminum				
Material, read head CES	Plastic (PPS)				
Solenoid material	Galvanized steel				
Weight	Approx. 0.3				kg
Ambient temperature	-25	-	+50		°C
Degree of protection acc. to IEC 60529	IP67				
Installation position	Any				
Solenoid					
Locking force in axial direction	500				N
Adhesive force due to remanence	Approx. 10 ± 25 %				N
- CEM-A-LE05K-S2/CEM-A-LE05K-S2-EX ¹⁾					
- CEM-A-LE05R-S2	Approx. 0.5				
Solenoid center offset max.	± 2.5				mm
Operating voltage U _B plug S1	24 +10%/-15%				V DC
Solenoid voltage U _{CM} plug S1	24 +10%/-15%				
Reverse polarity protection	Yes				
Free-wheeling diode	Yes				
Current consumption CEM-A-LE05K-S2/CEM-A-LE05K-S2-EX	100				mA
- At connection S1.1 (U _{CM})					
Current consumption CEM-A-LE05R-S2	12 100				mA
- At connection S1.2 (U _B) at U _{CM} = 0 V at U _{CM} = 24 V					
- At connection S1.1 (U _{CM})	15				
Power consumption	Approx. 2.5 Approx. 2.8				W
- CEM-A-LE05K-S2/CEM-A-LE05K-S2-EX - CEM-A-LE05R-S2					
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	-	-	20		mm
- Assured switch-off distance S _{ar}					
Cable length l = 0 to 25 m	0	2 - - 0.7	- - -		
- Switch-on distance					
- Assured switch-on distance S _{ao}					
- Switching hysteresis					
Connection evaluation unit plug S3	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 acc. to EN ISO 13849-1



For possible combinations see page 24

Adjustable adhesive force

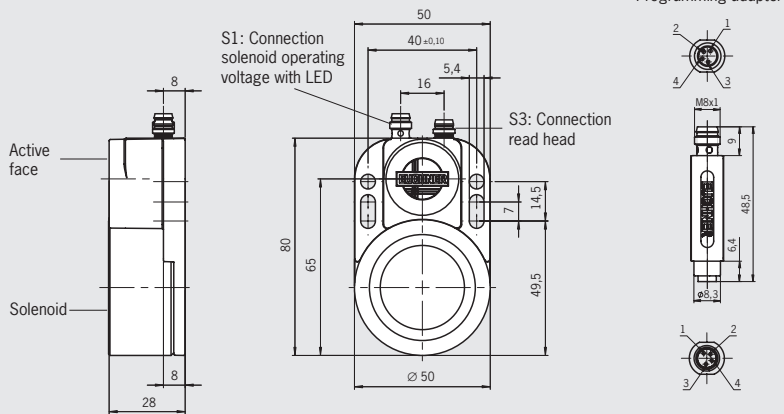
This version has an adhesive force also with the guard locking switched off. In this way it is intended, e. g., to prevent the safety door opening due to vibration or similar. The adhesive force can be adjusted using a programming adapter to 30 N, 50 N or 80 N.

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

Read head CEM-A-LE05H-S2

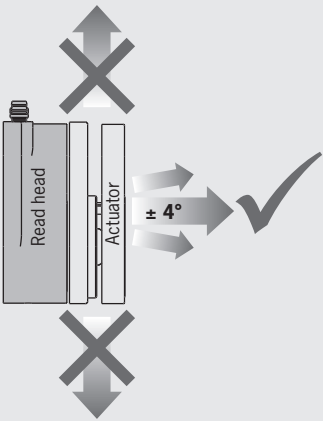


Dimension drawing

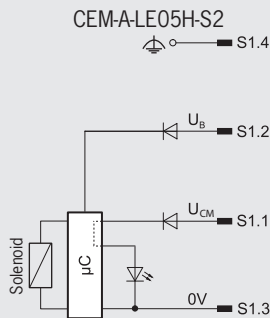


For connection cables see page 69/70

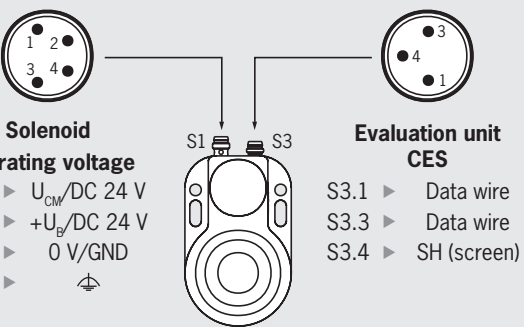
Approach direction



Wiring diagram



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



Ordering table

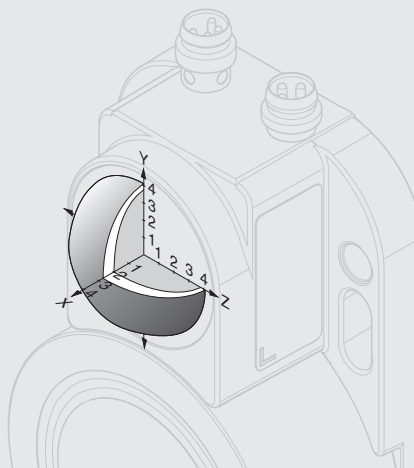
Series	Locking force [N]	Version	Order no / item
CEM-A-LE05H-S2	500	With adjustable adhesive force (50 N preset)	104606 CEM-A-LE05H-S2
CEM-A-ZPS-110013	-	Programming adapter for setting the adhesive force	110013 CEM-A-ZPS-110013

Technical data read head CEM-A-LE05H-S2

Parameter	min.	Value typ.	max.	Unit
General				
Housing material		Aluminum		
Material, read head CES		Plastic (PPS)		
Solenoid material		Galvanized steel		
Weight		Approx. 0.3		kg
Ambient temperature	-25	-	+50	°C
Degree of protection acc. to IEC 60529		IP67		
Installation position		Any		
Solenoid				
Adhesive force		30, 50 (factory setting) or 80 adjustable by pre-excitation		N
Locking force in axial direction		500		N
Solenoid center offset max.		± 2.5		mm
Operating voltage U_B plug S1		24 +10%/-15%		V DC
Solenoid voltage U_{CM} plug S1		24 +10%/-15%		
Reverse polarity protection		Yes		
Free-wheeling diode		Yes		
Current consumption				mA
- At connection S1.2 (U_B) at $U_{CM} = 0$ V		25		
at $U_{CM} = 24$ V		100		
- At connection S1.1 (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 S3		M8 plug connector (male socket), 3-pin		
Connection cable	-	-	25	m

Typical operating distance

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





Read head CEM-A-LH10...

- ▶ Read head with guard locking without guard lock monitoring
- ▶ Locking force 1000 N
- ▶ With and without remanence
- ▶ Up to category 4 acc. to EN ISO 13849-1



For possible combinations see page 24

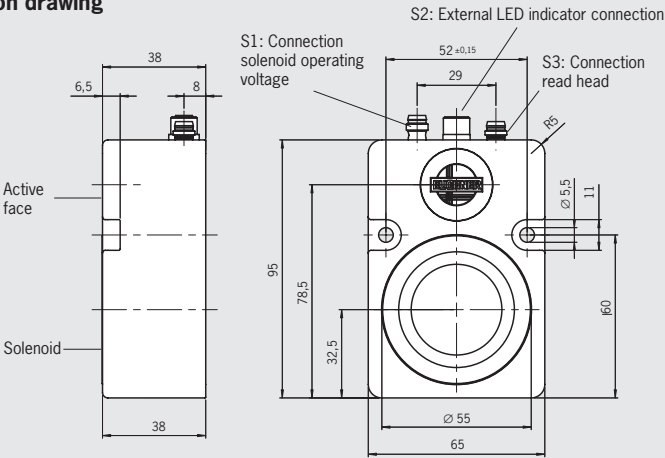
Remanence

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

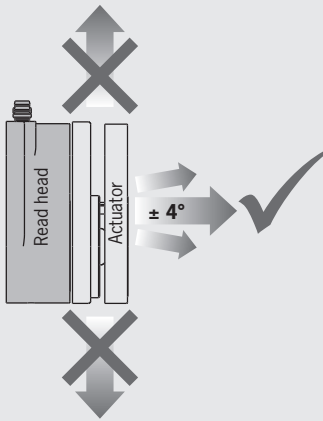


Dimension drawing



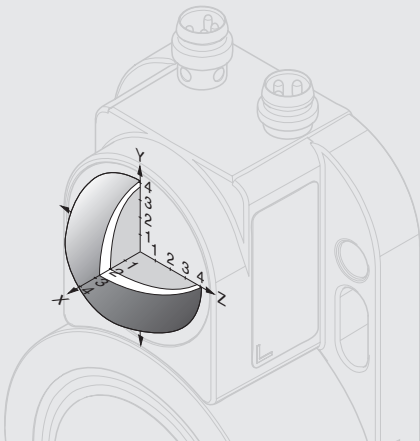
For connection cables see page 69 - 71

Approach direction

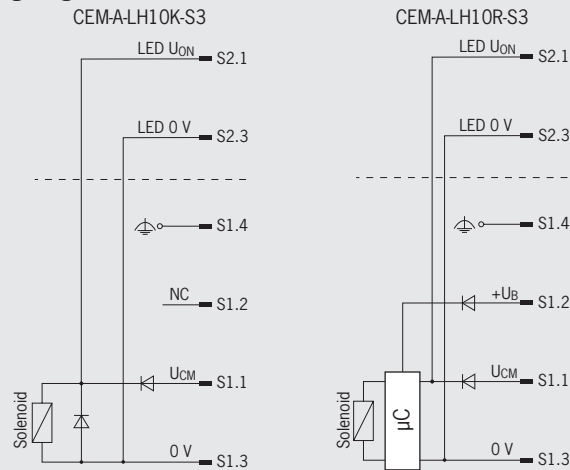


Typical operating distance

Safe switch-off distance
Note $s_{sw} = 20$ mm for internal component failure.
Safety outputs are safely switched off.



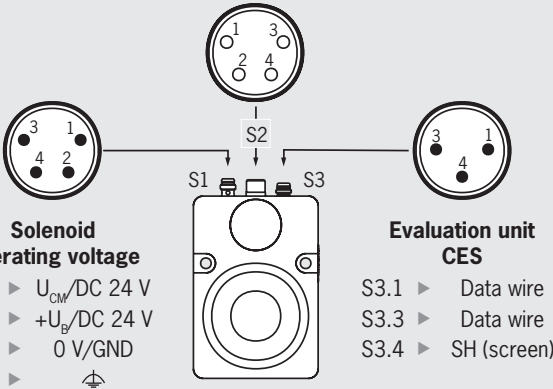
Wiring diagram



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

Connection of external LED indicator

- S2.1 ▶ LED U_{ON}
- S2.2 ▶ -
- S2.3 ▶ LED 0 V
- S2.4 ▶ -



Ordering table

Series	Locking force [N]	Version	Order no / item
CEM-A-LH10K-S3	1000	With remanence	095170 CEM-A-LH10K-S3
CEM-A-LH10R-S3	1000	Without remanence	095793 CEM-A-LH10R-S3

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

Parameter	min.	Value typ.	max.	Unit
General				
Housing material		Aluminum		
Material, read head CES		Plastic (PPS)		
Solenoid material		Galvanized steel		
Weight		Approx. 0.9		kg
Ambient temperature	-25	-	+50	°C
Degree of protection acc. to IEC 60529		IP67		
Installation position		Any		
Solenoid				
Locking force in axial direction		1000		N
Adhesive force due to remanence				N
- CEM-A-LE10K-S2 ¹⁾		Approx. 40 ± 25 %		
- CEM-A-LE10R-S2		Approx. 0.7		
Solenoid center offset max.		± 2.5		mm
Operating voltage U_B plug S1		24 +10%/-15%		V DC
Solenoid voltage U_{CM} plug S1		24 +10%/-15%		
Reverse polarity protection		Yes		
Free-wheeling diode		Yes		
Current consumption CEM-A-LH10K-S3				mA
- At connection S1.1 (U_{CM})		225 (without external LED)		
Current consumption CEM-A-LH10R-S3				mA
- At connection S1.2 (U_B) at $U_{CM} = 0$ V		12		
- At connection S1.2 (U_B) at $U_{CM} = 24$ V		225		
- At connection S1.1 (U_{CM})		15		
Power consumption				W
- CEM-A-LE05K-S2		Approx. 5.4		
- CEM-A-LE05R-S2		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 S3		M8 plug connector (male socket), 3-pin		
Connection cable	-	-	25	m
Connection external LED indicator plug S2				
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/CEM-A-BE05-EX



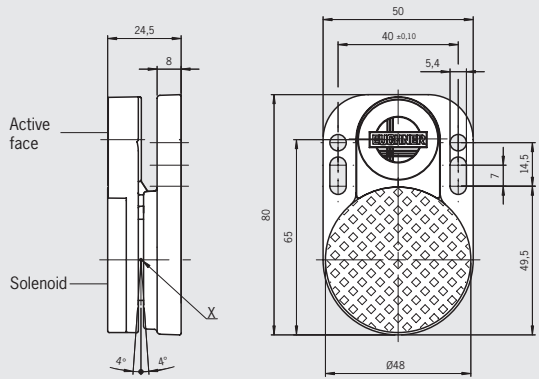
► Locking force 500 N

Actuator CEM-A-BE05/CEM-A-BE05-EX

Dimension drawing



For possible combinations see page 24



2 safety screws
M5x16 included

Ordering table

Series	Order no / item
CEM-A-BE05	094805 CEM-A-BE05
CEM-A-BE05-EX	097178 ¹⁾ CEM-A-BE05-EX

Technical data

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

1) EX II 3G Ex nA IIC T6

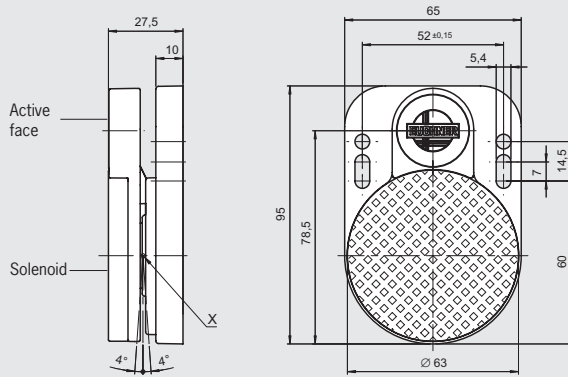
Actuator CEM-A-BH10

► Locking force 1000 N

Actuator CEM-A-BH10



Dimension drawing



2 safety screws
M5x16 included

For possible combinations see page 24

Ordering table

Series	Order no / item
CEM-A-BH10	095175 CEM-A-BH10

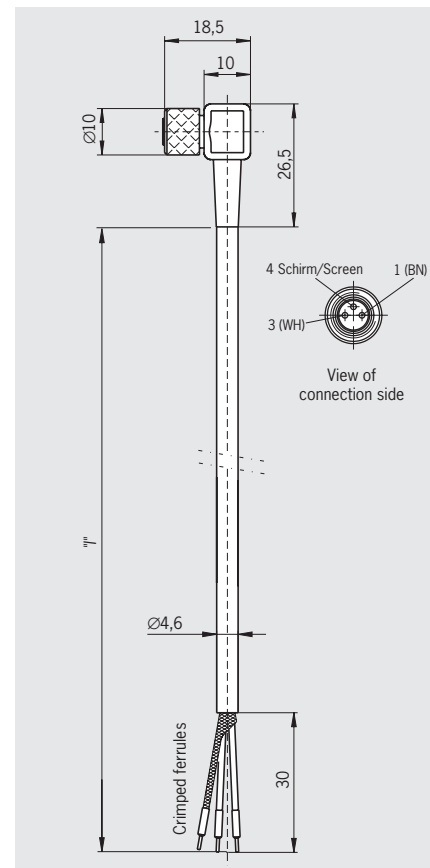
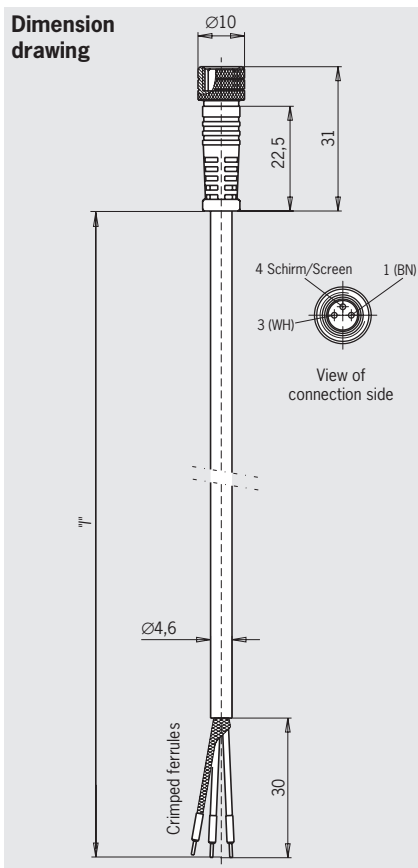
Technical data

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

► For read heads with M8 plug connector

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

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



CES-AZ

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	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 Cable PUR	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 Cable PUR	10	098590 C-M08F03-02X025PU10,0-ES-098590

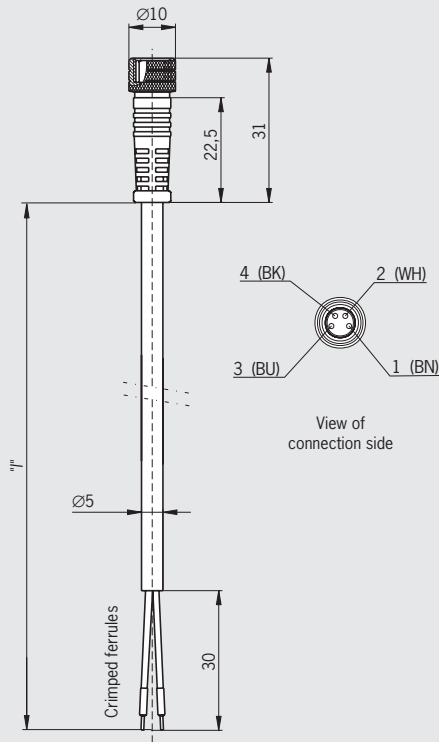
Technical data

Parameter	min.	Value typ.	max.	Unit
Plug connector		3-pin M8 female plug, straight		
Connection		Screw terminal, knurled nut not connected to cable screen		
Conductor cross-section		2 x 0.25 screened		mm ²
Material, outer sheath		PVC Ø 4.6 or PUR Ø 4.8 (PUR cables are suitable for drag chains)		mm
Cable length		Max. 25 (taking into account the switching distance)		m

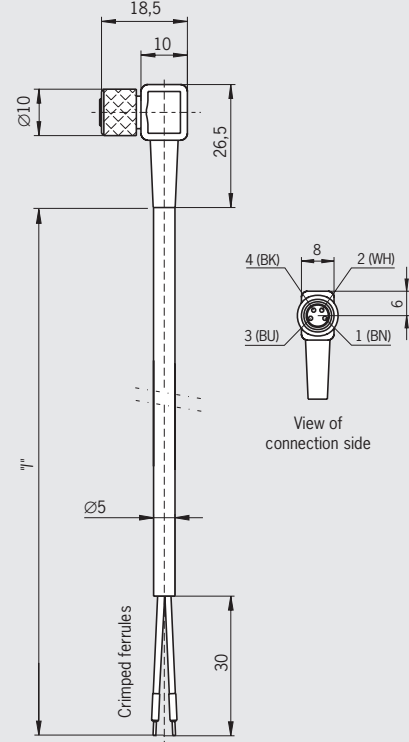
Connection cables with plug connectors

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
			50	097100 C-M08F04-04X025PV50,0-ES-097100
	Angled	V PVC cable	10	084703 C-M08F04-04X025PV10,0-ES-084703

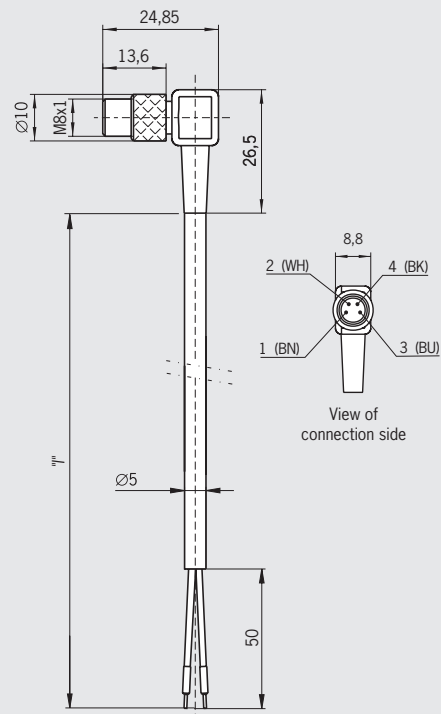
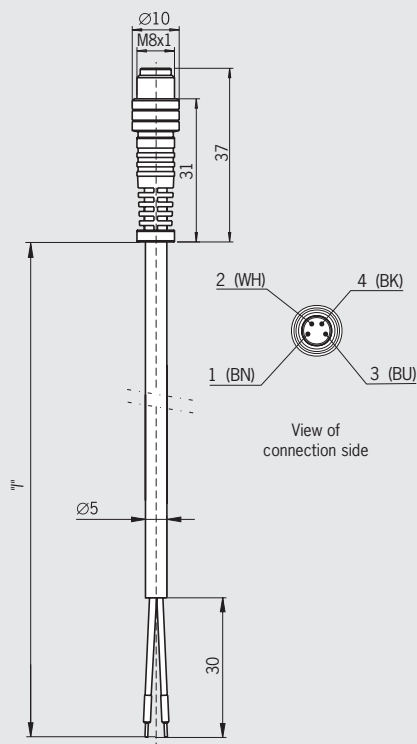
Technical data

Parameter	min.	Value typ.	max.	Unit
Plug connector		4-pin M8 female plug		
Connection		Screw terminal		
Conductor cross-section		4 x 0.25		mm ²
Material, connector housing		PUR black		
Material, outer sheath		PVC Ø 5.0		mm
Material, union nut		CuZn nickel-plated		
Bending radius		Min. 70		mm

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

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

Dimension drawing



CES-AZ

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	min.	Value typ.	max.	Unit
Plug connector		4-pin M8 male plug		
Connection		Screw terminal		
Conductor cross-section		4 x 0.25		mm ²
Material, connector housing		PUR black		
Material, outer sheath		PVC \varnothing 5.0		mm
Material, union nut		CuZn nickel-plated		
Bending radius		Min. 10 x sheath diameter		mm