EN

# Transponder-coded safety systems **CEM** with guard locking for process protection

EUCHNER
More than safety.

# Transponder-coded safety systems CEM

CEM safety systems are modern interlocking devices for the protection of persons, machines and processes. Based on transponder technology, they combine a safety door monitor and a solenoid in a single system. CEM products are used in safeguarding movable guards for reliable detection of doors in closed position and guard locking for process protection.

## Layout

The CEM systems essentially consist of the following components:

- Actuator with coded transponder and movable anchor plate
- Guard locking solenoid
- Read coil
- Evaluation electronics

## Simple function and operation

The guard locking solenoid is mounted on the fixed part of the guard, the actuator on the movable part. When the door is closed, the actuator is moved towards the guard locking solenoid. When the door is fully closed, the read coil continuously reads the coded transponder data from the actuator by means of induction and forwards it to the evaluation electronics.
If the transmitted data matches the stored data, the safety outputs are enabled. A high magnetic force acts between the guard locking solenoid and anchor plate of the actuator when voltage is applied.

## Guard locking type

All CEM products feature electric guard locking by solenoid force (open-circuit current principle). The actuator's anchor plate is in contact with the solenoid when the guard is closed. When the solenoid is activated, this produces a magnetic field that attracts the anchor plate (actuator) with a high locking force.

## Adhesive force

Many applications require the safety door to be held in closed position with adhesive force when guard locking is not active. This is intended to prevent unintentional opening of the guard or automatic opening of the safety door due to vibrations. The user can set the required adhesive force in several steps up to 50 N (CEM-C40) or 150 N (CEM-A-LE5) as needed. If an adhesive force of 0 N is set, the solenoid will be demagnetized as soon as the locking force is switched off. This prevents residual magnetism (remanence) of the solenoid.
The guard locking solenoids (CEM-A / CEM-C60) have an optional integrated permanent magnet. The guard is held in closed position with a force of 30 N when the installation is switched off.

## Actuator

The actuator's spring-mounted anchor plate can be deflected up to an angle of ±4°. This allows the actuator to adjust itself independently to the surface of the CEM guard locking solenoid when the door is closed.

## Simple compliance with standards

Transponder coding ensures maximum safety. The requirements of relevant standards can be met with only a single CEM system. Irrespective of whether category 4 / PL e according to EN ISO 13849-1 must be achieved or whether the requirements in EN ISO 14119 must be met – you're always on the safe side with the CEM.

## Overview of features

- **Secure against tampering**
- **Adjustable adhesive force**
- **Sturdy housing**
- **Category 4 / PL e**
- **Permanent magnet**

- **Internal / external evaluation**
- **High degree of protection**
- **Meets EN ISO 14119**
- **Locking force 600 N / 1,000 N**
- **No wearing parts**

# Transponder-coded safety systems CEM

## Different coding levels

- **Unicode**: Each CEM actuator features transponder coding that significantly surpasses the requirement in the EN ISO 14119 standard for a type 4 switch with a high coding level. The actuator's transponder code is unambiguously assigned to the safety switch by means of a teach-in operation. This effectively prevents the guard from being bypassed using an identical actuator. The requirement in the standard for effective protection against tampering is also met in this way. If necessary, a new actuator can be taught in at any time.

- **Multicode**: For applications that do not require an actuator with a high coding level, multicode safety switches can be used. The actuator is not unambiguously assigned to the safety switch in this case. It is only checked whether the actuator is valid.

## Comprehensive range of sophisticated accessories

A wide range of accessories offers maximum flexibility for integration and mounting. Lockout bars are available in addition to bolt systems, mounting plates and pre-assembled cables.

| Accessories | CEM-A-LE05 | CEM-C40 |
|---|---|---|
| Lockout bar |  |  |
| Mounting plates |  |  |
| Bolt system |  | – |

# A variety of solutions

## CEM-A: System with external evaluation

**External evaluation of signals in the control cabinet**

The guard locking solenoid with the read coil is accommodated in a housing (read head). The actuator's transponder signals are read by the read coil and forwarded to a CES evaluation unit in the control cabinet (external evaluation). Up to four CEM-A read heads can be connected to a CES evaluation unit.

## CEM-C60: Variable system with internal evaluation

**Internal evaluation of signals in an individually selected switch**

The system consists only of an actuator and a guard locking solenoid.
The associated safety switch with integrated read coil and evaluation electronics can be selected as required and is mounted on the guard locking solenoid.

## CEM-C40: Safety switch with internal evaluation

**Internal evaluation of signals in the safety switch**

The guard locking solenoid with the read coil and the evaluation electronics form a closed unit in a housing (safety switch). All safety functions are combined in a single component (internal evaluation).
The system also offers adhesive force monitoring when the solenoid is switched on.

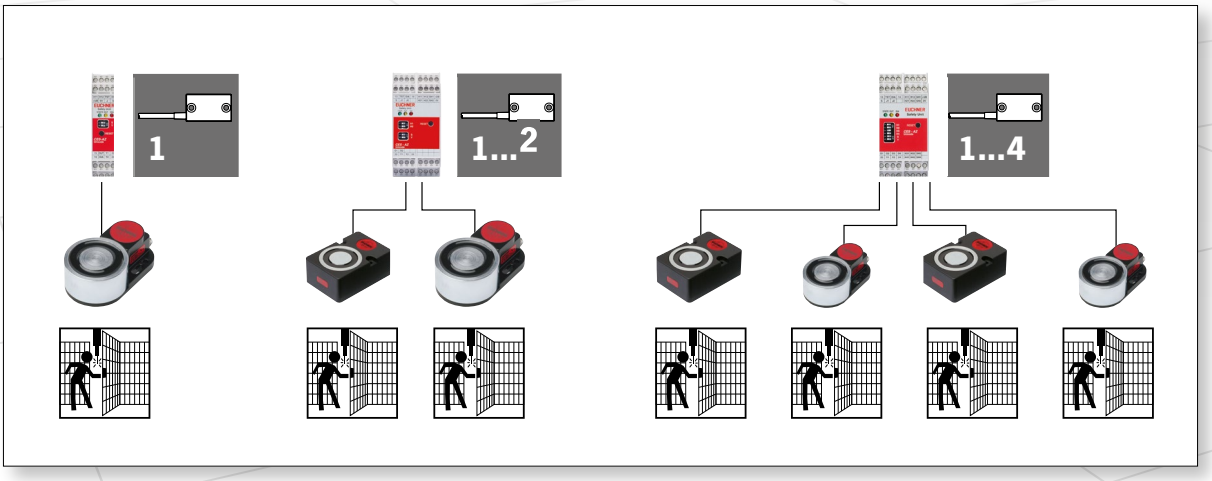
# CEM-A – Systems with external evaluation

## External evaluation of signals in the control cabinet


With external evaluation of the transponder signals, the evaluation electronics are accommodated in a separate housing in the control cabinet. Up to four CEM-A devices or additional read heads from EUCHNER can be connected to the CES evaluation unit and evaluated.
The wiring work is minimal, because each read head can be connected to the evaluation unit via only two flexible wires.

### CES-AZ evaluation units

CES evaluation units combine transponder evaluation with a safety relay in a single device. They feature two safety outputs and monitoring outputs for every connected read head. They also have connections for a monitored start button and a feedback loop for monitoring downstream contactors. The safety outputs are switched via relay contacts and permit the direct connection of contactors and loads up to 6 A. Evaluation units are available in unicode or multicode versions for connecting one read head or up to two or four read heads. The guard locking solenoids are controlled individually.



## CEM-A read heads


**Read head CEM-A-LE05**

- Locking force 650 N
- With and without remanence
- Connection via two M8 plug connectors
- LED indicator in M8 plug connector
- Small design
- Robust metal housing
- Nickel-plated surface

Optional versions:

- Adjustable adhesive force of 70 N / 110 N / 150 N with programming adapter
- Integrated permanent magnet (30 N)
- With hard-wired connecting cables


**Read head CEM-A-LH10**

- Locking force 1,000 N
- With and without remanence
- Connection via two M8 plug connectors
- LED indicator in M8 plug connector
- Connection for external LED indicator
- Robust metal housing
- Nickel-plated surface

# CEM-C60 – Variable systems with internal

## Internal evaluation of signals in an individually selected switch

This system offers guard locking for process protection in a modular design. It consists of a CEM actuator and a CEM-C60 guard locking solenoid that prevents safety doors from opening unintentionally. The guard locking solenoid is combined with a safety switch for reliable detection of the door position. The safety switch with integrated read coil and evaluation electronics can be selected as required and is mounted on the guard locking solenoid. The CEM-C60 can be combined with the non-contact safety switch CES-C04 (with AR/AP interface) or CES-C07 (with BR/BP interface).

### Combinations

| Guard locking solenoid | Safety switch | Actuator | Use |
|---|---|---|---|
|  | CES-C04<br>  | for CES-C04<br>  |  |
| | CES-C07<br>  | for CES-C07<br>  |  |

Safety switches from the AR / BR system family are suitable for series connection. Up to 20 CES-C04-AR or CES-C07-BR devices or other EUCHNER products that have an AR / BR interface can be interconnected in series. If the wiring of the safety switches takes place in the control cabinet, the door position monitoring outputs for all switches are available.

In a series circuit with Y-plugs, the individual door position monitoring outputs and other status information can be read if these evaluation units are used:

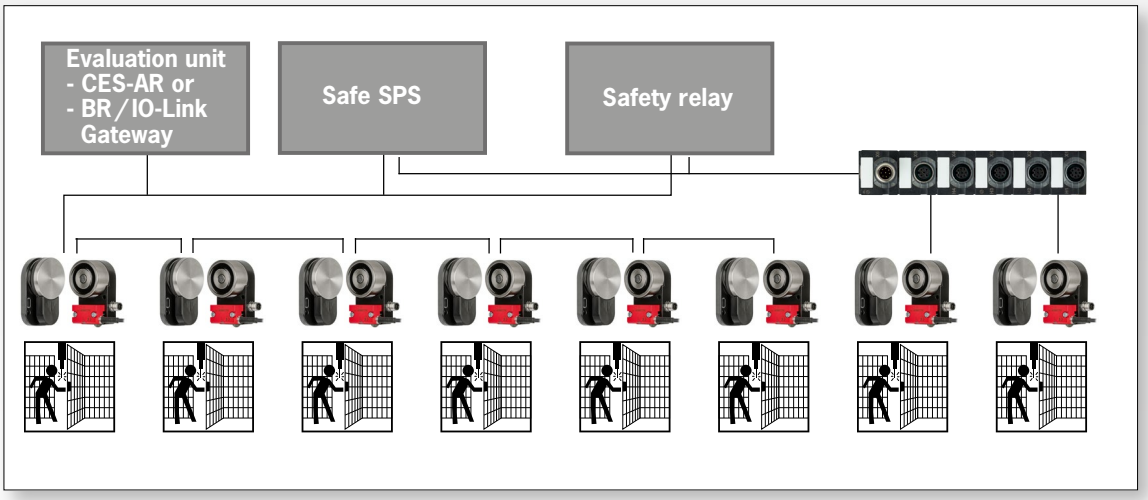
- AR evaluation unit CES-AR-AES-12 (for switches with AR interface)
- Safety relay with BR / IO-Link Gateway ESM-CB and BR / IO-Link Gateway GWY (for switches with BR interface)

The outputs on the safety switch can be connected to decentral peripheral devices or directly to safe control systems.

The CEM-C60 guard locking solenoids are controlled individually. The pin assignment for the 5-pin M12 plug is suitable for direct connection to IP67 peripheral devices (e.g., ET 200pro from Siemens).

# evaluation

## Using safety switches in the AR / BR system family




## Using safety switches in the AP / BP system family

Safety switches from the AP / BP system family are suitable for use as a single device. They are fitted with a 5-pin M12 connection and are appropriate for direct connection to IP67 peripheral devices.

## CEM-C60 guard locking solenoid at a glance

- 650 N electromagnetic guard locking force for process protection
- Simple connection of the solenoid via M12 plug connector either on the right or left of the housing
- Possible to connect directly to IP67 peripheral devices (e.g., ET 200pro)
- Nickel-plated solenoid surface is highly resistant to corrosion
- Integrated permanent magnet with 30 N adhesive force (optional)
- Considerable flexibility in choice of safety switch and a suitable connection variant thanks to modular design
- Mounting compatible with the CEM read heads long established on the market

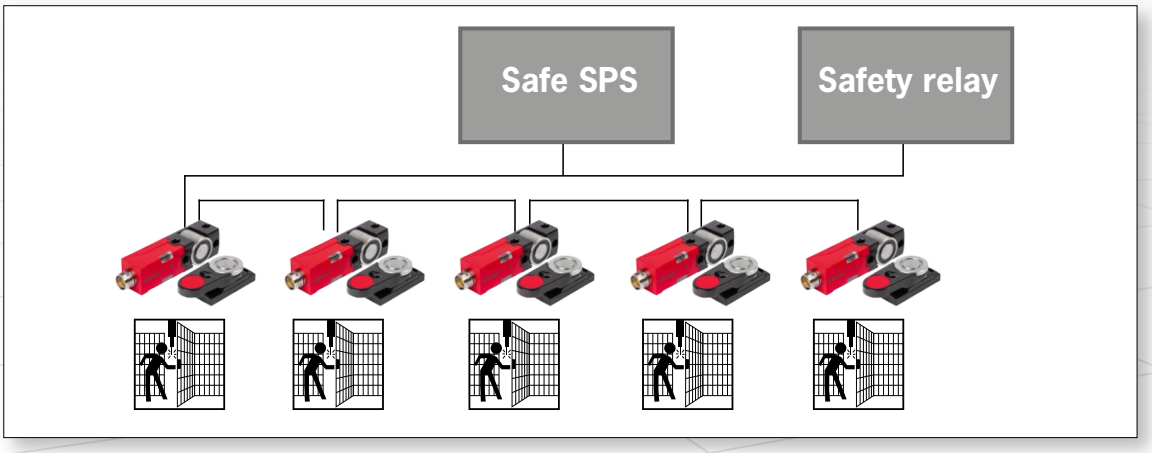
# CEM-C40 – Safety switch with internal

## Internal evaluation of signals in the safety switch

With internal evaluation, the evaluation electronics and read coil are accommodated in the same housing (safety switch). The switches feature pulsed safety outputs (semiconductor, OSSD) to detect short circuits in the connecting cables. The outputs on the safety switch can be connected to decentral peripheral devices or directly to safe control systems. On the activation of the guard locking, the device checks whether the locking force is at least 400 N. If the locking force is greater than 400 N, the switched status signal OL can be evaluated by the control system.

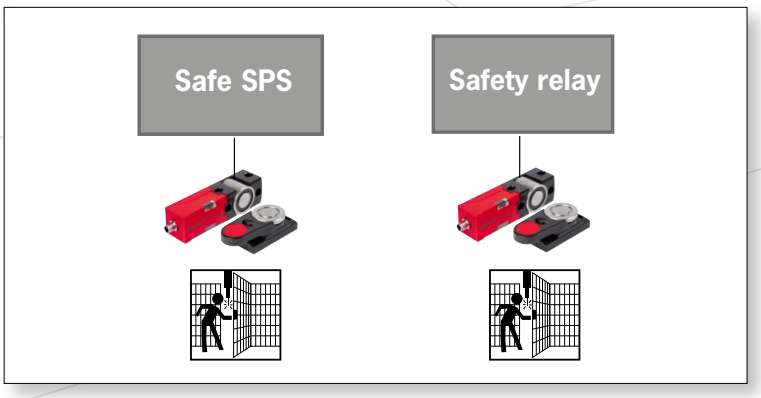
### AR system family

Safety switches from the AR system family are suitable for series connection. Up to 20 CEM-C40-AR devices or other EUCHNER products with an AR interface can be interconnected in series. Wiring takes place in the control cabinet. All status information (monitoring outputs: door position, guard locking, diagnostics) of the individual CEM-C40 products can be forwarded directly to the control system. The CEM-C40 guard locking solenoids are controlled individually.




### AY system family

Safety switches from the AY family are suitable for use as a single device. They are equipped with an M12 connection and feature pulsed semiconductor outputs. The test pulse duration is 0.8 ms.



# evaluation

## CEM-C40 in detail

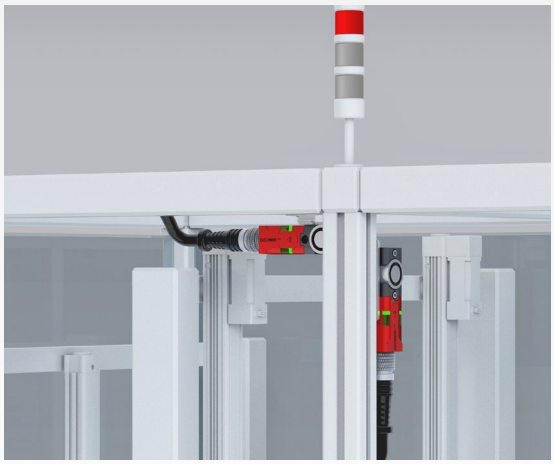
- **Degree of protection IP65 / IP67**
  ideally suited for industrial use
- **Fastening option in three directions**
  for flexible mounting
- **Immediate diagnostic function**
  by means of LED display, monitoring outputs and a diagnostics monitoring output
- **Locking force measurement**
  when solenoid is activated. If the force is > 400 N, a status signal is transmitted to the control system.
- **Can be connected in series**
  with up to 20 CEM-AR-C40 devices
- **Locking force 600 N**
- **Nickel-plated solenoid surface and anchor plate**
  resist abrasion and corrosion
- **Adjustable adhesive force**
  of 0 N / approx. 30 N / approx. 50 N
  via parameterization key


- **Dirt resistant**
- **Streamlined design**
  ideal for space-saving mounting
- **Simple wiring**
  via M12 or M23 plug connector
- **Reliable detection of the door position**
  The safety outputs are not switched until the anchor plate is in contact with the solenoid and the transponder signals are read.
- **Actuator with movable anchor plate**
  Deflection in all directions (± 4°)
- **Permissible center offset**
  5 mm in all directions
- **Two actuator versions**
  - Adjustable in longitudinal direction
  - Adjustable in transverse direction

# Overview of CEM advantages

- Guard locking for process protection and reliable detection of the door position
- Excellent safety characteristics in accordance with category 4 / PL e for reliable detection of the door position
- High level of protection against tampering
- High locking force of 600 N / 650 N / 1,000 N
- Almost unlimited number of switching cycles
- Actuator with spring-mounted anchor plate
- No precise door adjustment necessary

CEM-C40: Adhesive force adjustable in steps
(0 N / approx. 30 N / approx. 50 N)



CEM-C40: Can be mounted in a variety of ways

CEM-A-LE05: Safeguarding of a hinged door



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