# MC88C

## Rectangular safety magnetic sensors



### Benefits

- **Standards compliance.** Up to Cat. 4 PL e in accordance with EN ISO 13849-1.
- **Customizable.** The sensors are available with left or right exit, integrated cable, M8 or pigtail with M12 connector and optionally LED indicator.
- **High performance.** Reinforced polymeric casing (PBT) with a protection degree IP67, operating temperature range from -25°C to +80°C. IP69K for M8 versions without LED.
- **Rectangular housing.** 88 x 25 x 13 mm.
- **Different outputs.** 2NO, 1NO + 1NC or 2NO + 1NC. (The status of the output is intended without the actuator)
- **Approvals** by CE, cULus

### Description

The MC88C series are encoded safety magnetic sensors with rectangular housing used to monitor the position of hinged, sliding or removable guards of industrial applications.
Carlo Gavazzi safety sensors stop or disconnect the dangerous motions, if the mobile protections are opened or displaced. They are suitable for safety gates applications up to safety category 4, PLe according to EN ISO 13849-1 with suitable logic safety module.
MC88C sensors are the right answer in harsh industrial environments with damp and dusty condition.

### Applications

The safety magnetic sensors together with the magnetic actuator are particularly suitable to monitor protections of the safety gates that allow the entry to machines with dangerous movements, mainly in environment with strong presence of dust and dirtiness.
When connected to a safety module, the system can reach safety category up to category 4, PL e (EN ISO 13849-1).

### Main functions

- Actuation without mechanical contact for high durability in all environmental conditions.
- Sensors are completely sealed and so insensitive to dirt and dust.
- Suitable for applications with large tolerances or where mechanical features may change over the time, thanks to the wide actuation range.



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# References

## Order code

**MC88CH □ □ □ □**

Enter the code option instead of □

| Code | Option | Description | Note |
|---|---|---|---|
| M | - | Magnetic | |
| C | - | Rectangular size | |
| 88 | - | 88mm length | |
| C | - | Plastic | |
| H | - | Reed contact | |
| □ | 2O | Contacts: 2 normally open | With open guard |
| | 1O1C | Contacts: 1 normally open and 1 normally closed | With open guard |
| | 2O1C | Contacts: 2 normally open and 1 normally closed | With open guard |
| □ | L | Left exit | |
| | R | Right exit | |
| □ | A2 | Connection type: PVC cable 2m | |
| | M5 | Connection type: M8 integrated connector | |
| | T1 | Connection type: pig tail with M12 connector | |
| □ | Null | No LED | |
| | L | With LED indicator | |

## Magnetic actuator

**MC88CM1 (5mm)**

**MC88CM2 (8mm)**

**MC88CM3 (18mm)**



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## Type selection

### Left exit



| Connection | Output type | LED | Ordering no. |
|---|---|---|---|
| PVC cable 2m | 2NO | No | **MC88CH2OLA2** |
| | | Yes | **MC88CH2OLA2L** |
| | 1NO + 1NC | No | **MC88CH1O1CLA2** |
| | | Yes | **MC88CH1O1CLA2L** |
| | 2NO + 1NC | No | **MC88CH2O1CLA2** |
| | | Yes | **MC88CH2O1CLA2L** |
| M8 integrated connector | 2NO | No | **MC88CH2OLM5** |
| | | Yes | **MC88CH2OLM5L** |
| | 1NO + 1NC | No | **MC88CH1O1CLM5** |
| | | Yes | **MC88CH1O1CLM5L** |
| Pig tail with M12 connector | 2NO | No | **MC88CH2OLT1** |
| | | Yes | **MC88CH2OLT1L** |
| | 1NO + 1NC | No | **MC88CH1O1CLT1** |
| | | Yes | **MC88CH1O1CLT1L** |

### Right exit

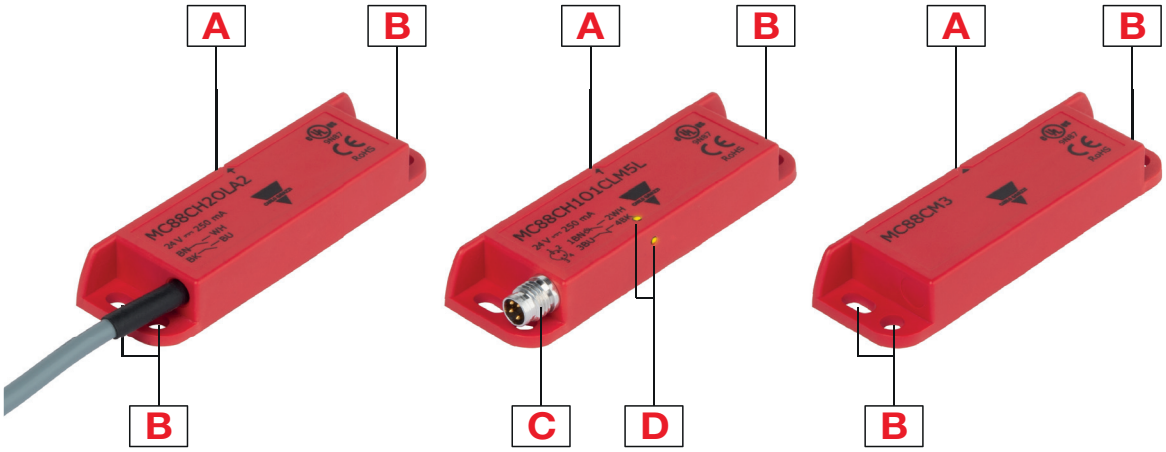


| Connection | Output type | LED | Ordering no. |
|---|---|---|---|
| PVC cable 2m | 2NO | No | **MC88CH2ORA2** |
| | | Yes | **MC88CH2ORA2L** |
| | 1NO + 1NC | No | **MC88CH1O1CRA2** |
| | | Yes | **MC88CH1O1CRA2L** |
| | 2NO + 1NC | No | **MC88CH2O1CRA2** |
| | | Yes | **MC88CH2O1CRA2L** |
| M8 integrated connector | 2NO | No | **MC88CH2ORM5** |
| | | Yes | **MC88CH2ORM5L** |
| | 1NO + 1NC | No | **MC88CH1O1CRM5** |
| | | Yes | **MC88CH1O1CRM5L** |
| Pig tail with M12 connector | 2NO | No | **MC88CH2ORT1** |
| | | Yes | **MC88CH2ORT1L** |
| | 1NO + 1NC | No | **MC88CH1O1CRT1** |
| | | Yes | **MC88CH1O1CRT1L** |



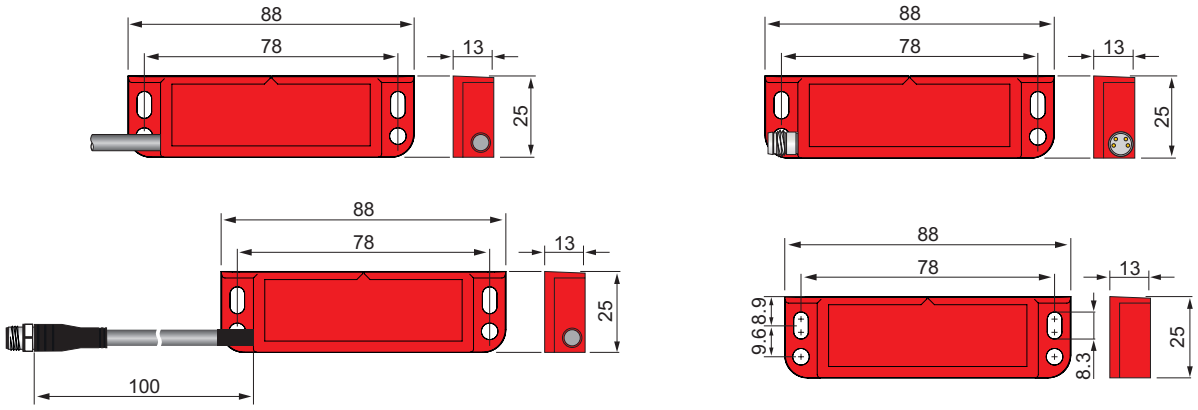
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# Structure




| Element | Component |
|---|---|
| A | Sensing face |
| B | Screw hole |
| C | M8, 4 pin, male connector |
| D | LED |

# Dimensions [mm]



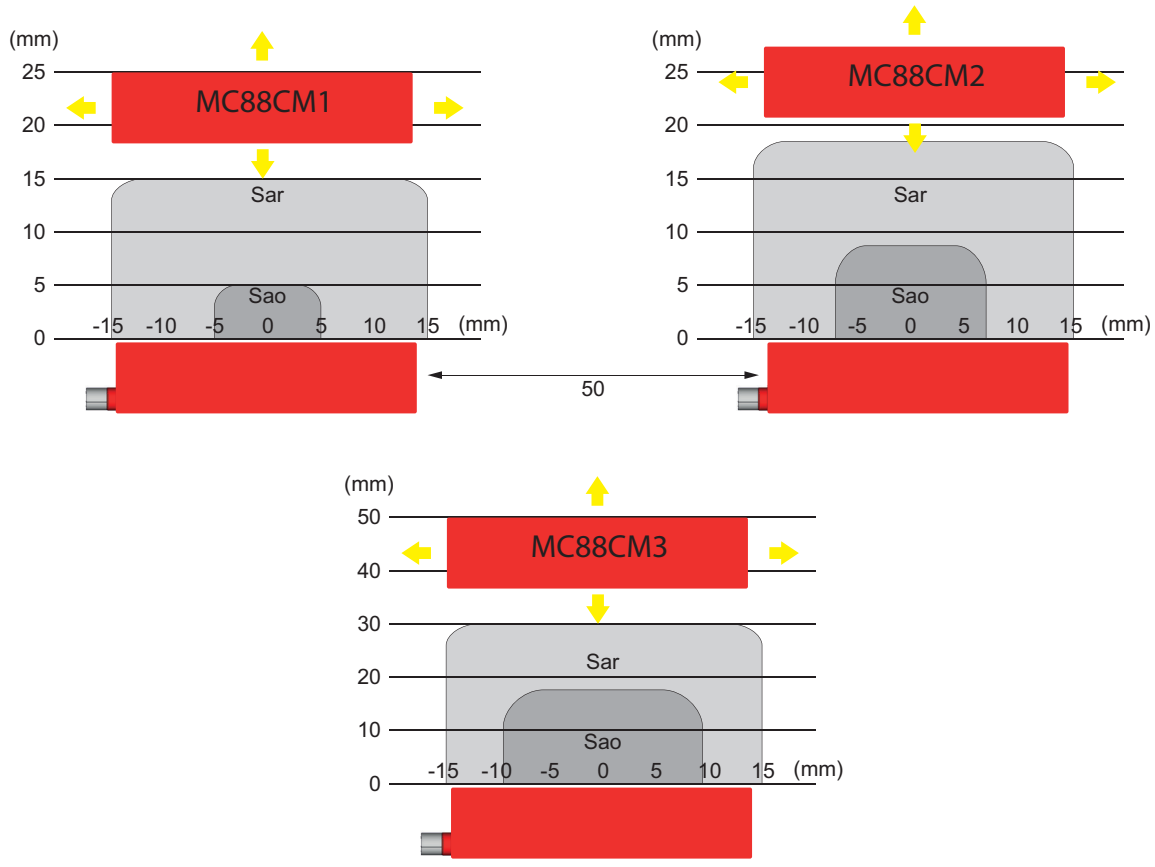



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# Sensing

## Detection

| | |
|---|---|
| **Assured switching distance ($S_{ao}$)** | 5mm with actuator MC88CM1<br>8mm with actuator MC88CM2<br>18mm with actuator MC88CM3 |
| **Assured switch-off distance ($S_{ar}$)** | 15mm with actuator MC88CM1<br>18mm with actuator MC88CM2<br>30mm with actuator MC88CM3 |
| **Minimum distance between two sensors** | 50 mm |




Note: the typical detection characteristic shown may vary from sensor to sensor.

## Accuracy

| | |
|---|---|
| **Repeat accuracy (R)** | ≤ 10% |



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# Features

## Outputs

| | |
|---|---|
| **LED indication** | Yellow (optional) |
| **Type** | 2NO, 1NO+1NC, 2NO+1NC Reed contact |
| **Rated operating voltage ($U_e$)** | 12-24 Vac/dc |
| **Rated operating current ($I_e$)** | 0.25 A (resistive load) |
| **Max switching load** | 6 W (resistive load) |
| **Rated insulation voltage $U_i$ (IEC EN 60947-1)** | 120 Vac (with cable / M12)<br>60 Vac / 75 Vdc (with M8 connector) |
| **Rated impulse withstand voltage $U_{imp}$ Line-to-ground (1.2/50 µs) Ri 500Ω** | 6 KV / 1.5 KV (with M8 connector) |
| **Protection class** | III |
| **Reverse polarity protection** | Yes |

## Response times

| | |
|---|---|
| **Max. operating frequency (f)** | 100 Hz |
| **Response time** | < 10 ms |

## Environmental

| | |
|---|---|
| **Operating temperature** | -25° to +80°C (-13° to +176°F) |
| **Storage temperature** | -25° to +80°C (-13° to +176°F) |
| **Vibration resistance EN 60068-2-6** | 10 g (10...150 Hz) |
| **Shock resistance EN 60068-2-27** | 30 g (11 ms) |
| **Degree of protection EN 60529** | IP67; IP69K for M8 versions without LED |
| **Pollution degree IEC 60947-5-1** | 3 |

## Mechanical data

| | |
|---|---|
| **Housing material** | PBT red |
| **Weight** | 85 g |
| **Max torque for M8 version** | 1.5 Nm |



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| | |
|---|---|
|  | • Use non-magnetic screw only.<br>• Fasten steadfastly the sensor and the actuator to the safety device (by means of rivets, tamper-proof screws, etc.).<br>• Fasten the sensor on plane surfaces only, in order to avoid possible distorsions that could damage the sensor or alter switching distances.<br>• To activate the safety sensors it is necessary to use the proper coded actuator MC88CMx. Conventional magnets cannot be used.<br>• The sensor and actuator central reference marks must be opposed and aligned. |

## Electrical connection

| | |
|---|---|
| **Connection type** | 2m PVC cable 4 x 0.25 mm²; 2m PVC cable 6 x 0.25 mm² |
| | M8 4-pin connector |
| | Pig tail: PVC cable / 0.1 m; Ø 5 mm; with M12 connector |

## Compatibility and conformity

| | |
|---|---|
| **Conforms to the standards** | EN/IEC 60947-5-1 |
| **Conforms to the directive** | 2006/42/CE Machinery Directive<br>2014/35/EU LVD Directive<br>2014/30/EU Electromagnetic Compatibility Directive<br>2011/65/UE RoHS Directive |
| **Electrostatic discharge (ESD)** | IEC 61000-4-2<br>15KV Air discharge, 8KV Contact discharge |
| **Performance level (PL)** | PL e - according to EN ISO 13849-1* |
| **Safety category** | Up to 4 - according to EN ISO 13849-1* |
| **Terminal marking** | In accordance with IEC 60947-5-1 |
| **B10d for each channel** | 700.000 operations (@ 250mA resistive load)<br>Mechanical endurance: 80 millions operations |
| **Approvals** | CE c UL us |

* When connected to a safety module



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# Connection Diagrams

### Cable version

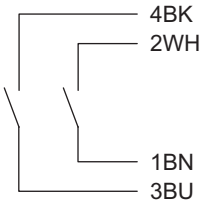



**Fig. 1** *2 NO (without LED)*

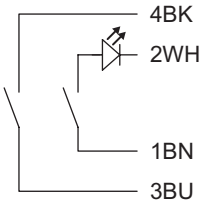



**Fig. 2** *2 NO (with LED)*

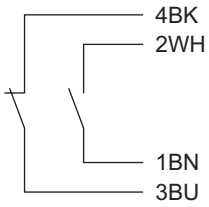



**Fig. 3** *1 NO + 1 NC (without LED)*

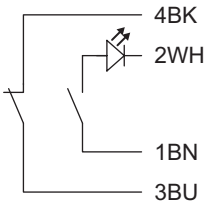



**Fig. 4** *1 NO + 1 NC (with LED)*

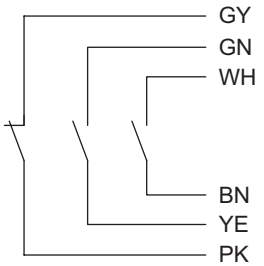



**Fig. 5** *2 NO + 1 NC (without LED)*

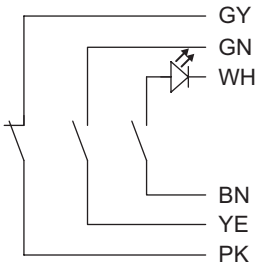



**Fig. 6** *2 NO + 1 NC (with LED)*

| Colour code | | | | | | | |
|---|---|---|---|---|---|---|---|
| BN: Brown | WH: White | BK: Black | BU: Blue | GN: Green | GY: Grey | YE: Yellow | PK: Pink |

### M8 connector version

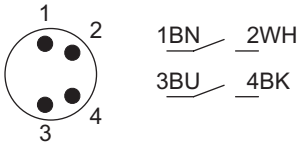



**Fig. 7** *2 NO (without LED)*

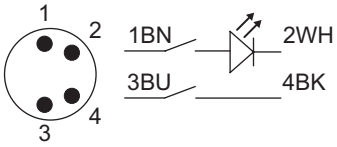



**Fig. 8** *2 NO (with LED)*

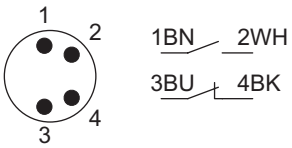



**Fig. 9** *1 NO + 1 NC (without LED)*

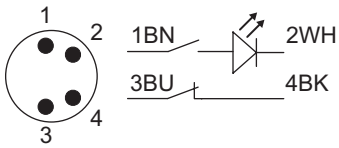



**Fig. 10** *1 NO + 1 NC (with LED)*



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### M12 connector version

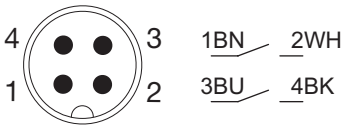



**Fig. 11** *2 NO (without LED)*

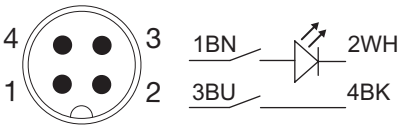



**Fig. 12** *2 NO (with LED)*

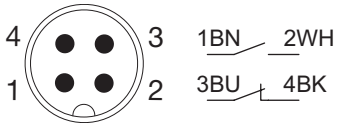



**Fig. 13** *1 NO + 1 NC (without LED)*

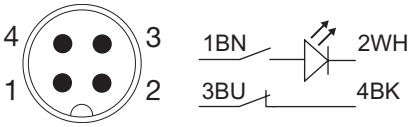



**Fig. 14** *1 NO + 1 NC (with LED)*



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