

## User Information

English translation

### Correct Use

**ZCode-MZ is a coded tamper-proof safety interlock for the process protection in machinery and plant engineering. The ZCode-MZ has been developed to provide a reliable door interlock. Coding is achieved by using radio frequency (RFID) and magnetic technology, both principles need to be satisfied for the switch to operate safely. These redundant diverse structure provides the highest degree of anti-tamper, virtually impossible to override. The different housing materials allow the use in almost any environments, including the intensive cleaning pharma and food industry.**

### Features

- High degree of anti-tamper due to redundant diverse structure (RFID and magnet)
- 2 NC safety outputs, 1 auxiliary output
- Unicode (activation by one factory set actuator) and Mastercode (any actuator will operate any switch) available
- Wide tolerance to guard misalignment
- High protection rate IP69K stainless steel, IP67 plastic
- Connect up to 20 switches to one standard safety relay
- High operational life without moving or touching parts
- Up to PL e, Cat. 4 according to EN ISO 13849-1
- Switches achieve Coding Levels Type 4, low coding with master code and Type 4, high coding with unicode type according to EN ISO 14119.
- Holding forces between 600 – 1500 N
- Able to connect the most popular safety controllers and safety relays.



Fig. 1: ZCode-MZ Stainless Steel Body Material



### Function

#### ZCode-MZ are locking devices for process protection

The magnetic safety switches ZCode-MZ are designed in order to provide and maintain a high level of functional safety whilst providing a reliable magnetic door interlock.

The ZCode-MZ combines magnetic sensing and RFID technology to provide non contact operation and high anti-tamper coding. In addition, an electromagnet is used to lock machine guards.

Only when the actuator is in the correct position the interlock can be achieved and the safety outputs will close.

ZCode-MZ provides two safe switching outputs for use with popular safety relays (ZANDER SR Series) or safety controller (e.g. ZANDER TALOS<sup>®</sup>) as well as a semiconductor auxiliary signal to indicate the door position.

There are two 2 LEDs that offer 5 diagnostic functions to the user.

**The guard holding has no interlock function.**

**The interlock is based on "Power to Lock". Therefore consideration must be given in the event of a power failure to machines where a run downtime is present before the hazard is removed.**

### Installation

M5 mounting bolts must be used to fix the switches and actuators. Tightening torque for mounting bolts to ensure reliable fixing is 1 Nm. Always mount on to non-ferrous materials. To achieve nominal holding force ensure face to face alignment of magnetic parts (see Fig. 2).

Do not mount adjacent switches or actuators closer than 30 mm. Typical solenoid center offset is 5 mm in any direction.

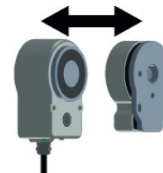


Fig. 2: Operating direction

### Safety Precautions



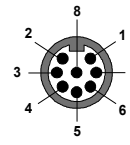
- Installation and commissioning of the device must be performed **only by authorized personnel**.
- Observe the country-specific regulations when installing the device.
- The electrical connection of the device is only allowed to be made with the device isolated.
- The wiring of the device must comply with the instructions in this user information, otherwise there is a risk that the safety function will be lost.
- The Risk Assessment for the particular application should include the risk of spare actuators. These should not be readily available and must be securely controlled
- It is not allowed to open the device, tamper with the device or bypass the safety devices.
- All relevant safety regulations and standards are to be observed.
- The overall concept of the control system in which the device is incorporated must be validated by the user.
- Failure to observe the safety regulations can result in death, serious injury and serious damage.
- Record any RFID codes as required by factory rules or with reference to any risk assessment for the particular application.

## User Information

### Electrical Connection

The installation of all ZCode - safety interlocks must be in accordance with a risk assessment for the individual application. For monitoring the ZCode switches, the two redundant outputs must be connected to a safety emergency stop relay (e.g. ZANDER SR<sup>®</sup>C<sup>™</sup>) or a dual channel connection has to be made with the inputs of a safety controller.

After installation always check each function by opening and closing each guard individually in turn and ensuring that the green LED on the switch and the LEDs on the safety relay or controller are illuminated when the switch is closed and are extinguished when the switch is open. Check that the machine stops and cannot be re-started when each switch is opened.



View of M12-Connector

M12	Colour	Signal
2	red	operating voltage, 24V
3	blue	operating voltage, GND
7	black	safety contact 1, NC
1	white	safety contact 1, NC
4	yellow	safety contact 2, NC
6	green	safety contact 2, NC
8	orange	Lock Applied, 24V
5	brown	auxiliary contact AUX, NO

Fig. 4 Terminals M12 Connector

### Switch Status

Switch Status	Guard	Green LED	Yellow LED
Locked	Closed	Steady	Off
Solenoid Power OFF (unlocked)	Closed	Flashing	Off
Guard Open	Open	Off	Steady
Door Forced Open	Open	Off	Flashing
Wrong Actuator Code	Closed	Flashing	Flashing



Fig. 5: Yellow light indicates open

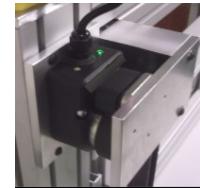


Fig. 6: Green light indicates closed

### Applications

When connecting one ZCode to a ZANDER emergency stop safety relay the highest Performance Level PL e, Cat. 4 will be achieved.

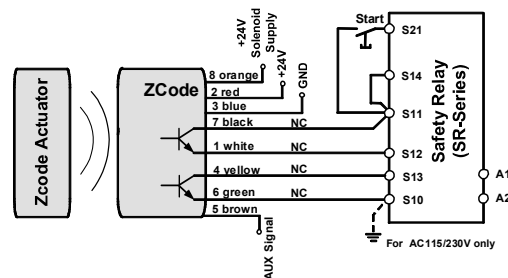


Fig. 7: Single connection of a ZCode to one ZANDER SR<sup>®</sup>C<sup>™</sup> (category 4, PL e)

However, it is also possible to connect up to 20 sensors to one safety relay, e.g. ZANDER SR-Series (up to PL d, safety category 3). By connection up to 10 sensors check that the power supply DC 24 V is without under voltage at the safety relay. For recognizing possible single faults each door should be opened and closed individually.

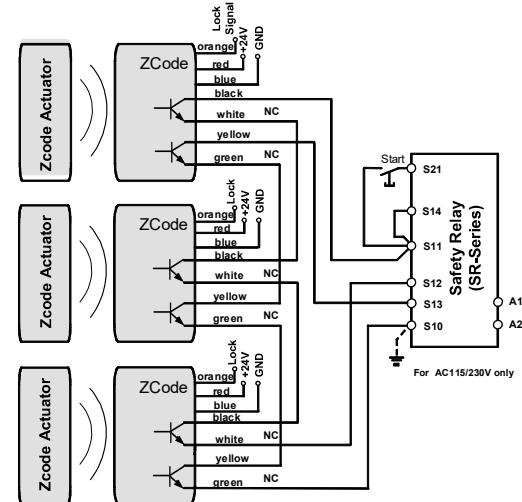


Fig. 8: Connecting up to 20 ZCode in series to one ZANDER SR<sup>®</sup>C<sup>™</sup> (category 3, PL d)

### Commissioning Procedure



**Note:** The items listed under "Electrical connection" must be observed during commissioning.

#### 1. Mounting the device:

See subitem „Installation“. Check the distance between switch and actuator.

#### 2. Wiring:

Installation of all switches and safety relays must be in accordance to your application and the required Performance Level (see Fig. 7, Fig. 8).

**Caution:** Check the installation specifications of the used emergency stop safety relay.

Wiring only in de-energized state. ZCode has to be de-energized before teaching a spare actuator (only possible with master code types),

#### 3. Starting the device:

Switch on the operating voltage for the safety sensor and safety emergency stop relay.

#### 4. Check your application:

After installation always check each switch function by opening and closing each guard individually in turn.

Ensure that the green LED at the switch and also both LED's on the safety inputs of the emergency stop safety relay are lit while the door is closed and are extinguished when the switch is open.

#### 5. Triggering safety function:

Check that the machine stops and cannot be re-started when a switch is open.

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### Maintenance

**Monthly:** Check alignment of actuator. Check switch case and wiring for signs of mechanical damage.

For applications where infrequent guard access is foreseeable, the system must have a manual function test to detect a possible accumulation of faults. At least once per month for PL e Cat. 3/4 or once per year for PL d Cat. 3 (ISO 13849-1). Where possible it is recommended that the control system of the machine demands and monitors these tests, and stops or prevents the machine from starting if the test is not done (ISO 14119).

Check that the machine stops and cannot be re-started when each switch is open.

Check each switch function and each door individually in turn and ensuring that the green light on the switch and appropriate LEDs on the Safety Relay are illuminated when the switch is closed and are extinguished when the switch is open. Check that the machine stops and cannot be re-started when each switch is open.

Never repair any switch, actuator or integral cables. Replace any switch displaying signs of mechanical damage to casing or cables.

The device is otherwise maintenance free, provided that it was installed properly.

### What to Do in Case of a Fault?

#### Device does not switch on:

- Check the wiring by comparing it to the wiring diagrams.
- Check the safety switch for correct adjustment.
- Check if the green LED is lit when the switch is closed.
- Check the operating voltage.

If the fault still exists, perform the steps listed under

“Commissioning Procedure”.

If these steps do not remedy the fault either, return the device to the manufacturer for examination.

**Opening the device is impermissible and will void the warranty.**

### Safety Characteristics According to DIN EN ISO 13849-1, EN 62061

The device is certified according to DIN EN ISO 13849-1 up to a Performance Level of PL e in combination with a suitable safety relay/ safety controller (Application compare to Fig. 7).

#### Note:

Additional data can be requested from the manufacturer for applications that deviate from these conditions.

#### DIN EN ISO 13849-1:2008-12

Performance Level	e (see Figure 7)
Categorie	4
MTTF <sub>d</sub>	1100 years
Diagnostic Coverage DC	99%
Safety Integrity Level	SIL 3
PFH	4.18E-05 (Coressponds to 4.2% of SIL3)
PFH (1/h)	4.77E-10 (Coressponds to 4.8% of SIL3)
Utilization time	20 years
d <sub>op</sub>	365 days/year
h <sub>op</sub>	24 hours/day

### Techn. Data

Corresponds to the standards	EN 60204-1; DIN EN ISO 13849-1; IEC 60947-5-3; DIN EN ISO 14119, UL508, CSA-C22.2 No.14
Approvals	CE, TÜV, UL
Power supply	DC 24 V, +/- 10% (SELV / PELV)
Holding force	Depending on body material and type, 600 –1500 N
Maximum switched current	200 mA (Minimum internal resistance 8.5 Ohms)
Delectric withstand	AC 250 V
Solenoid center offset	5 mm
Switching distance, max.	Sao 1 mm close / Sar 10 mm open
Switching frequency	max. 1.0Hz
Approach speed	200 mm/min - 1000 mm/s
Body material	MZ: Plastic, MZA: Die-Cast, MZE: stainless steel 316
Protection	IP67, IP69K (stainless steel)
Temperature range	-25 °C to +40 °C
Mounting	each 2 x M5 screws; tightening torque 1 Nm
Cable	PVC 8 core, 6 mm OD
Weight	approx. 1700 g (incl. 5 m cable)

## User Information

### Dimension Drawing

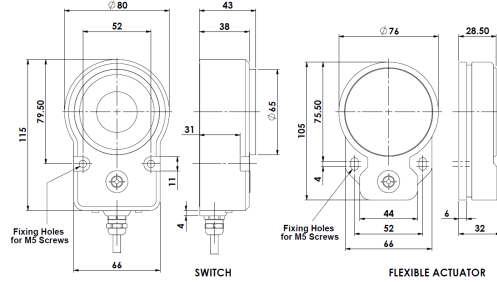


Figure 9: ZCode-MZ, Dimensions of all Strong Holding Force Variants

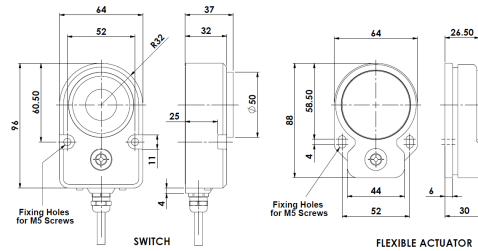


Figure 10: ZCode-MZ, Dimensions of all Medium Holding Force Variants

### Versions

#### Stainless Steel Housing:

Order No. 941500	ZCode-MZE-LM, 5 m Cable, 600 N Holding Force, Mastercode, incl. Actuator
Order No. 941501	ZCode-MZE-LM, M12, 600 N Holding Force, Mastercode, incl. Actuator
Order No. 941502	Replacement Actuator MZE-LM (Mastercode)
Order No. 941503	ZCode-MZE-LU, 5 m Cable, 600 N Holding Force, Unicode, incl. Actuator
Order No. 941504	ZCode-MZE-LU, M12, 600 N Holding Force, Unicode, incl. Actuator
Order No. 941505	ZCode-MZE-SM, 5 m Cable, 1100 N Holding Force, Mastercode, incl. Actuator
Order No. 941506	ZCode-MZE-SM, M12, 1100 N Holding Force, Mastercode, incl. Actuator
Order No. 941507	Replacement Actuator MZE-SM (Mastercode)
Order No. 941508	ZCode-MZE-SU, 5 m Cable, 1100 N Holding Force, Unicode, incl. Actuator
Order No. 941509	ZCode-MZE-SU, M12, 1100 N Holding Force, Unicode, incl. Actuator

#### Plastic Housing:

Order No. 941520	ZCode-MZ-LM, 5 m Cable, 1000 N Holding Force, Mastercode, incl. Actuator
Order No. 941521	ZCode-MZ-LM, M12, 1000 N Holding Force, Mastercode, incl. Actuator
Order No. 941522	Replacement Actuator MZ-LM (Mastercode)
Order No. 941523	ZCode-MZ-LU, 5 m Cable, 1000 N Holding Force, Unicode, incl. Actuator
Order No. 941524	ZCode-MZ-LU, M12, 1000 N Holding Force, Unicode, incl. Actuator
Order No. 941525	ZCode-MZ-SM, 5 m Cable, 1500 N Holding Force, Mastercode, incl. Actuator
Order No. 941526	ZCode-MZ-SM, M12, 1500 N Holding Force, Mastercode, incl. Actuator
Order No. 941527	Replacement Actuator MZ-SM (Mastercode)
Order No. 941528	ZCode-MZ-SU, 5 m Cable, 1500 N Holding Force, Unicode, incl. Actuator
Order No. 941529	ZCode-MZ-SU, M12, 1500 N Holding Force, Unicode, incl. Actuator

#### Accessories:

Order-No. 941200	M12 Extension Cable, 15 m lengths, PUR, female M12x1, open end cable
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Die-Cast housing available upon request.



Fig.11: ZCode-MZE-Lx



Fig. 12: ZCode-MZE-Sx



Fig.13: ZCode-MZ-Sx



