

## Operating Instructions

### Correct Use



ZCode-LRE are coded tamperproof safety switches for the use in machinery and plant engineering. 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 high specification stainless steel housings allow the use in rough and hygiene critical environments. In combination with a safety relay (e.g. ZANDER SR-Series, MINOS SD-Series), a safety logic device (e.g. ZANDER MINOS SL-Series) or a safety PLC (e.g. ZANDER TALOS-Series) the switches are self-monitoring with short-circuit protection.

- High degree of anti-tamper due to redundant diverse structure (RFID and magnet)
- 2 non-contact safety outputs and 1 non-contact auxiliary output
- Compatible to most safety logic devices, safety relays and safety PLCs
- Easy to install
- Unicode (activation by one factory set actuator) and Mastercode (any actuator will operate any switch) types available
- Wide tolerance to guard misalignment
- High specification housing IP69K, IP67
- For applications in rough environments and high hygiene requirements, e.g. food, pharma and process industry (CIP, SIP cleaning)
- Series Connection up to 20 switches to one ZANDER SR“C”- / MINOS SD1E safety relay or one ZANDER MINOS SL“1” safety logic
- Certified up to PL e, Cat. 4 according to EN ISO 13849-1, Construction type 4 according to ISO 14119
- Switches achieve a low coding level with Mastercode and high coding level with Unicode version according to EN ISO 14119
- High operational life without moving or touching parts
- Super compact dimensions



### Function

Coded RFID magnetic non contact safety switches ZCodes are designed to interlock hinge, sliding or removal guard doors (see Fig. 1).

The outputs of the ZCode-LRE will be switched off, if the guard door is opened, whereupon the safety outputs of the wired emergency stop device shut down the system securely.

The ZCode-LRE operates contactless with an RFID and coded magnetic sensing system, which provides a wide sensing distance (up to 10 mm) and provides a high tolerance to misalignment. They can be fitted behind stainless steel and can operate from 4 directions even in dusty, hot and humid environments.



Fig. 1: Application examples

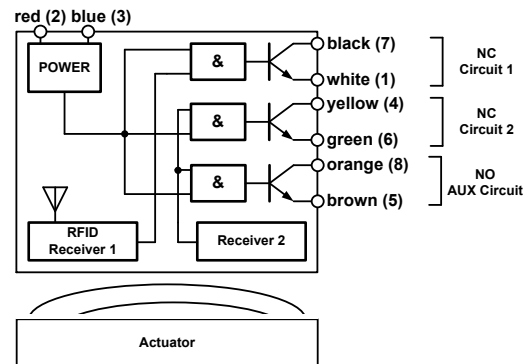


Fig. 2: Block diagram

### Installation

M4 mounting bolts must be used to fix the switches and actuators, max. tightening torque 2 Nm. Always mount on to non ferrous materials. The recommended setting gap is 5 mm.

The safety switches must not be used as a mechanical stop. The actuators must not be allowed to strike the switch. An adjustment by striking with a hammer is inadmissible. Do not mount adjacent switches or actuators closer than 100 mm. Typical misalignment tolerance after setting is 5 mm in any plane (see Fig. 3).

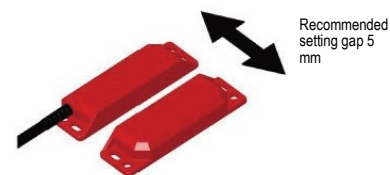


Fig. 3: Operating direction

### Safety Precautions



- Installation and commissioning of the device must be carried out **only by competent personnel** with appropriate experience of machine control integration, who have read and understood these operating instructions.
- 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 these operating instructions, otherwise there is a risk that the safety function will be lost.
- It is not allowed to open the device, tamper with the device or bypass the safety guards.
- All relevant safety regulations and standards are to be observed.
- It is the responsibility of the user to ensure the correct overall functionality of its systems and machines.
- Failure to observe the safety regulations can result in death, serious injury and serious damage.
- The risk assessment for the particular application should include the risk of spare actuators. Spare actuators should not be readily available and must be securely controlled.
- Record any RFID codes as required by factory rules or with reference to any risk assessment for the particular application and user location.

## Operating Instructions

English translation

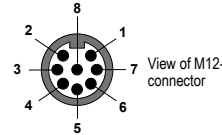
Errors and technical changes reserved

### Electrical Connection

The installation of all ZCode safety switches 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 commercially available safety emergency stop relay (e.g. ZANDER SR“C”, MINOS SD1E), a safety logic device (e.g. ZANDER MINOS SL1D / SL1E) or a dual channel connection has to be made with the inputs of a safety PLC (e.g. ZANDER TALOS-Series).

Pin	Open end	With M12 connector	Signal
2	red	brown	Supply voltage, 24 V
3	blue	green	Supply voltage, 0 V
7	black	blue	Safety contact 1, NC
1	white	white	Safety contact 1, NO
4	yellow	yellow	Safety contact 2, NC
6	green	rosa	Safety contact 2, NO
8	orange	red	Auxiliary output AUX, NO
5	brown	grey	Auxiliary output AUX, NO

Figure 4: Connectors and wire colours for ZCode switches with open end or with M12 connector



### Applications / Wiring Diagrams

Up to 20 ZCode switches can be connected to one commercially available emergency stop safety relay or safety logic device (e.g. Fig. 5 to 10: Wiring examples ZCode with ZANDER SR “C”, MINOS SD1E and MINOS

SL1D / SL1E). When more than 10 sensors are placed in series, make sure that the safety relay or the safety logic is applied with sufficient supply voltage of min. 24 V (relevant datasheets must be taken into account!).

### Safety Relay, Wiring Example: ZANDER SR “C”

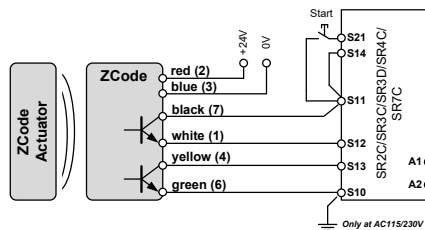


Figure 5: Single connection of a ZCode to one ZANDER SR“C” (up to category 4, PL e)

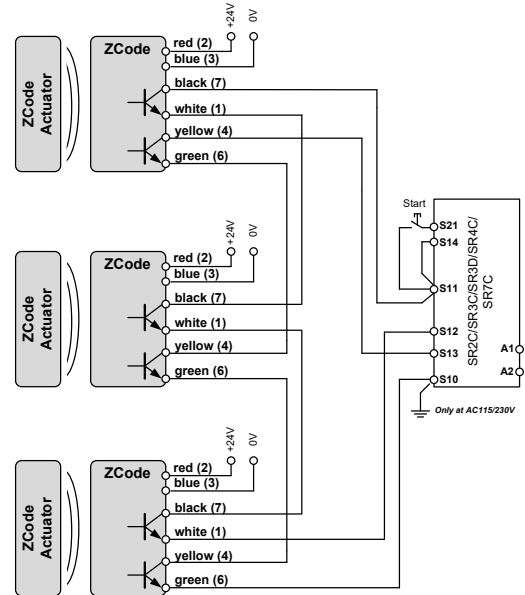


Figure 7: Connecting of 3 (up to 20) ZCodes in series to one ZANDER SR“C” (up to category 3, PL d)

### Safety Relay, Wiring Example: ZANDER MINOS SD1E

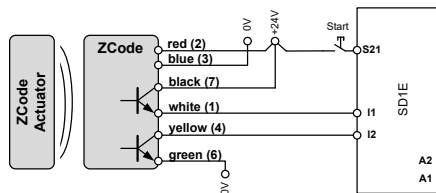


Figure 6: Single connection of a ZCode to one ZANDER MINOS SD1E (up to category 4, PL e)

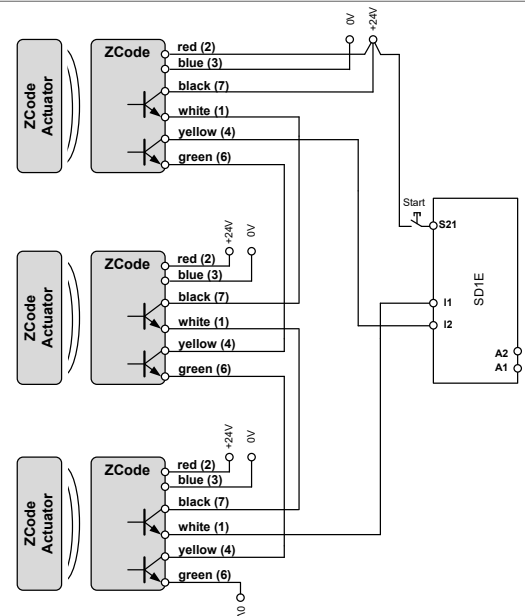


Figure 8: Connecting of 3 (up to 20) ZCodes in series to one ZANDER SD1E (up to category 3, PL d)

## Operating Instructions

Safety Logic,  
Wiring Example:  
ZANDER  
MINOS SL1E /  
SL1D

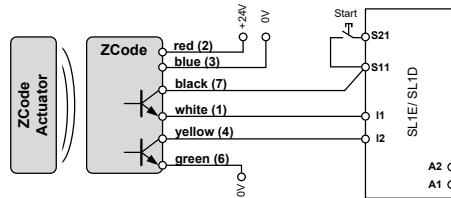


Figure 9: Single connection of a ZCode to one ZANDER MINOS SL1D (up to category 3, PL d) / SL1E (up to category 4, PL e)

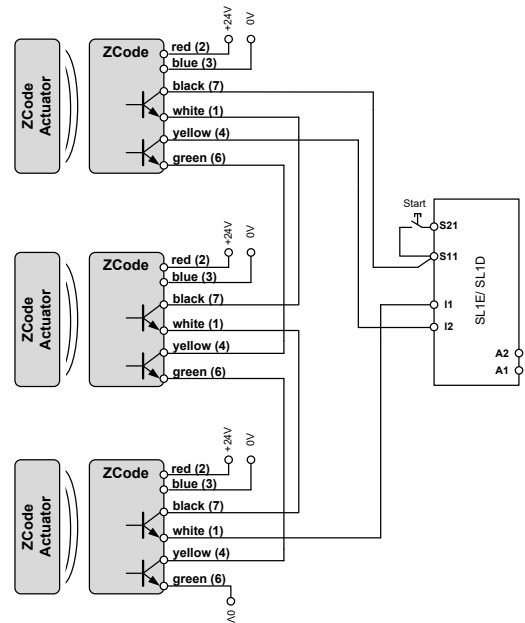


Figure 10: Connecting of 3 (up to 20) ZCodes in series to one ZANDER MINOS SL1D / SL1E (up to category 3, PL d)

Safety PLC,  
Wiring Example:  
ZANDER TALOS  
standard  
programs  
PR07 and PR08

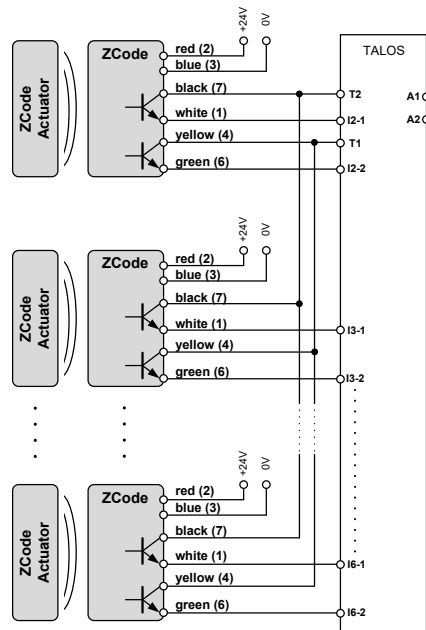


Figure 11: Connection of ZCodes to one ZANDER TALOS according to the configurations of the standard programs PR07 and PR08 (up to category 4, PL e)

### Commissioning Procedure



**Attention:** During commissioning, the items listed under „Electrical Connection“ must be considered (see above).

#### 1. Mounting the device:

Mount the device on the safety gate according to the instructions listed under "Installation". Pay attention to the correct fitting and distance between the switch and actuator.

#### 2. Wiring:

Wire the switch according to your application and performance level with the used safety relay, safety logic or PLC (see e.g. Fig. 5 to Fig. 11).

**Caution:** The wiring instruction in the operating instructions of the used safety device must be considered. Wiring only in de-energized state.

#### 3. Starting the device:

Switch on the operating voltage for the safety switch and safety device.

#### 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 the respectively diagnostic LEDs of the safety device are lit while the door is closed and are extinguished when the door is open.

#### 5. Triggering safety function:

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

### Maintenance

**Monthly:** Check alignment of actuator and look for signs of mechanical damage to the switch casing.

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). If 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 each switch function by opening and closing each guard individually in turn and ensure that the green LED on the switch and the appropriate LED's on the safety relay or control device 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.

“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.**

If the fault still exists, perform the steps listed under

### 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 .

The specified PL (for applications according to Fig. 5 to Fig. 11) values were determined under the following worst-case conditions for a guard door monitoring.

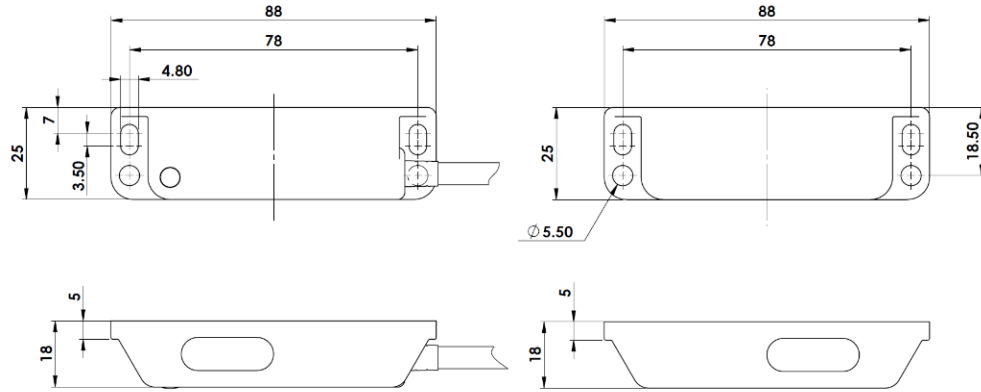
#### Safety Characteristics according to DIN EN ISO 13849-1 / EN 62061

Performance Level	e (Depending on the application, see Fig. 5 to Fig. 11)
Category	4
MTTF <sub>d</sub>	1100 years
Diagnostic Coverage DC	99 %
Safety Integrity Level	SILCL 3
PFD	4.18E-05 (Corresponds to 4.2 % of SIL3)
PFH (1/h)	4.77E-10 (Corresponds to 4.8 % of SIL3)
Proof Test Interval	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; EN ISO 13849-1; EN 60947-5-3; EN ISO 14119
Approvals	CE, TÜV
Power supply	DC 24 V, +/- 10 %
Contact rating outputs	DC 24 V, max. 200 mA, short circuit proof
Contact rating auxiliary output	DC 24 V, max. 200 mA, short circuit proof
Delectric withstand	AC 250 V
Recommended setting gap	5 mm
Switching distance, max.	Sao 10 mm close / Sar 20 mm open
Tolerance to misalignment	5 mm in any direction from 5 mm setting gap
Switching frequency	Max. 1.0 Hz
Approach speed	200 mm/min - 1000 mm/s
Body material	Stainless steel 316
Dimensions	88 mm x 25 mm x 18 mm
Protection	IP69K, IP67 (with M12-connector IP67)
Temperature range	-25°C to +80°C (105 °C for CIP / SIP cleaning (temporary))
Cable	PVC 8 core, 6 mm O.D. for 2 NC / 1 NO
Mounting	Each 2 x M4 screws; tightening torque max. 2 Nm; any position

### Dimensions



ZCode-LRE switch (left) and actuator (right)

3D-CAD-Data available upon request (step).

### Variants & Accessories

Order No. 941180	ZCode-LRE, M12, 2 NC / 1 NO, Mastercode, incl. actuator
Order No. 941181	ZCode-LRE, M12, 2 NC / 1 NO, Unicode, incl. actuator
Order No. 941182	ZCode-LRE, replacement actuator Mastercode
Order No. 941184	ZCode-LRE, 5m cable, 2 NC / 1 NO, Mastercode, incl. actuator
<b>Accessories:</b>	
Order No. 941200	M12 extension cable, 10 m lengths, female, 8-wire, open end cable

## CE Konformitätserklärung EC Declaration of Conformity

**Hersteller:** H. ZANDER GmbH & Co. KG  
**Producer:** Am Gut Wolf 15 • 52070 Aachen • Deutschland

**Produktgruppe:** RFID Sicherheitsschalter / Prozesszuhaltung  
**Product Group:** RFID Safety Switches / Process Interlock

Produkt Name Product Name	Zertifikats-Nr. No of Certificate
ZCode-PR/ZCode-LR.....	968/FSP 1020.02/19
ZCode-MZ-LU/ZCode-MZ-SU.....	968/FSP 1020.02/19
ZCode-MZ-LM/ZCode-MZ-SM.....	968/FSP 1020.02/19
ZCode-MZA-LU/ZCode-MZA-SU.....	968/FSP 1020.02/19
ZCode-MZA-LM/ZCode-MZA-SM.....	968/FSP 1020.02/19
ZCode-MZE-LU/ZCode-MZE-SU.....	968/FSP 1020.02/19
ZCode-MZE-LM/ZCode-MZE-SM.....	968/FSP 1020.02/19
ZCode-LRE/ZCode-JR.....	968/FSP 1020.02/19
ZCode-KR.....	968/FSP 1020.02/19

Die Produkte stimmen mit den Vorschriften folgender Europäischer Richtlinien überein:  
The products conform with the essential protection requirements of the following European directives:

2006/42/EG : Maschinenrichtlinie 2006/42/EG : Machinery directive	2011/65/EU: RoHS Richtlinie 2011/65/EU: RoHS directive
2014/30/EU : EMV Richtlinie 2014/30/EU : EMC directive	

Die Übereinstimmung der bezeichneten Produkte mit den Vorschriften der o.a. Richtlinie wird, falls anwendbar, nachgewiesen durch die vollständige Einhaltung folgender Normen:  
If applicable, the conformity of the designated products is proved by full compliance with the following standards:

EN 60204-1: 2018	EN 301 489-1: V2.1.1 (2017)
EN ISO 14119: 2013	EN 301 489-3: V1.6.1 (2013-06)

Gemäß Zertifikat der benannten Stelle:  
According to the certificate of the below mentioned organisation:

IEC 60947-5-3:2013	ISO 13849-1:2015
IEC 60947-5-2:2012 (in extracts)	IEC 62061:2015 + Corr.1:2015

Benannte Stelle / designated organisation:  
TUV Rheinland Industrie Service GmbH  
51105 Köln  
Bereich Automation Funktionale Sicherheit

Dokumentationsbeauftragte/-r: Christiane Nittschalk  
Documentation manager

Aachen, den 12.03.2019

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Geschäftsleitung  
General Manager

Dipl.-Ing. Alfons Austerhoff  
Leiter CE-Konformitätsbewertung  
Manager for EC declaration of conformity

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