

## Operating Instructions

English translation

Errors and technical changes reserved

### Correct Use



ZCode-MZ(E) are coded tamper-proof safety interlocks, which is using magnet- as well as RFID-technology for the process protection in machinery and plant engineering. This two-channel and also diverse principle enables maximum protection against manipulation. An activation is only possible with the appropriate actuator. The different housing materials allow the use in almost any environments, including the intensive cleaning pharma and food industry. 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 interlock) available
- Can also be used on poorly aligned safety doors
- Wide tolerance to misalignment
- High protection rate IP67 and IP69K for stainless steel
- Series Connection up to 15 switches to one ZANDER SR“C“- / MINOS SD1E safety relay or one ZANDER MINOS SL“1“ safety logic
- High operational life without moving or touching parts
- Certified up to PL e, Cat. 4 according to EN ISO 13849-1, Construction type 4 according to ISO 14119
- Switches achieve Coding Levels Type 4, low coding with master code and Type 4, high coding with Unicode type according to EN ISO 14119
- Max. holding forces between 600 – 1500 N (depends on variant)



ZCode-MZ-E-Lx

ZCode-MZ-E-Sx



ZCode-MZ-Sx



### Function

**Coded magnet-interlocks of the series ZCode-MZ(E) are designed to ensure with safety guards a high degree of process safety.**

The ZCode-MZ(E) 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(E) provides two safe switching outputs for use with commercially available safety relays (e.g. ZANDER SR-Series, MINOS SD1E), safety controller (e.g. ZANDER TALOS-Series) or safety logic (e.g. ZANDER MINOS SL1x-Series) as well as a semiconductor auxiliary signal to indicate the door position.

**The interlock is based on “Power to Lock“. Therefore ZCode-MZ(E) must not used as sole safeguarding for personal protection for following machines and systems. Further measures are imperative necessary.**

### Installation

M5 mounting bolts must be used to fix the interlock and actuators, max. tightening torque 2 Nm.

Always mount on to non-ferrous materials. To achieve nominal holding force ensure face to face alignment of magnetic parts (see Fig. 1).

Do not mount adjacent interlocks or actuators closer than 100 mm.

Typical solenoid center offset is 5 mm in any direction.

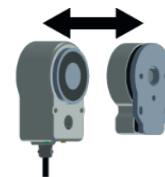


Fig. 1: Operating direction

### 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.

M07

E61-339-00

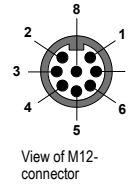
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### Electrical Connection

The installation of all ZCode interlocks must be in accordance with a risk assessment for the individual application. For monitoring the ZCode interlocks, 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).



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

Fig. 2: Terminals M12 connector

### Status Indication

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

(\*) Error acknowledgement by disconnecting from the supply voltage



Fig. 3: Yellow light indicates open

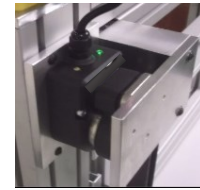


Fig. 4: Green light indicates closed

### Applications / Wiring Diagrams

Up to 15 ZCode interlocks 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“

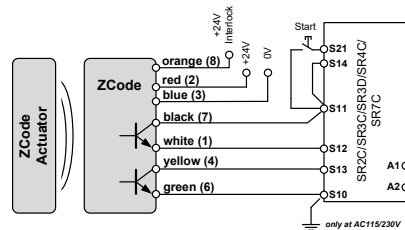


Fig. 5: Single connection of a ZCode to one ZANDER SR“C“ (up to category 4, PL e)

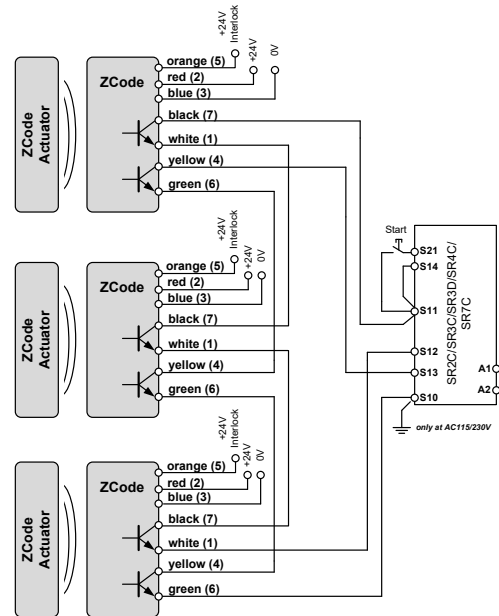


Fig. 6: Connecting of 3 (up to 15) ZCodes in series to one ZANDER SR“C“ (up to category 3, PL d)

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Safety Relay,  
Wiring Example:  
ZANDER  
MINOS SD1E

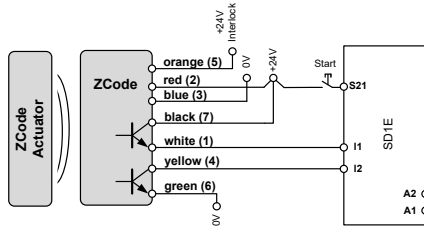


Fig. 7: Single connection of a ZCode to one ZANDER MINOS SD1E (up to category 4, PL e)

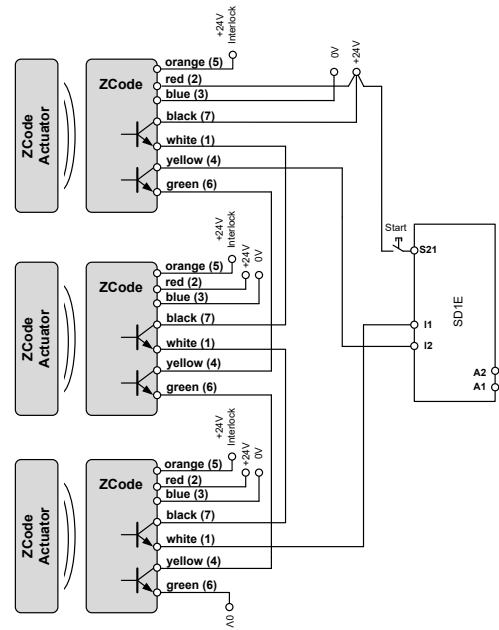


Fig. 8: Connecting of 3 (up to 15) ZCodes in series to one ZANDER SD1E (up to category 3, PL d)

Safety Logic,  
Wiring Example:  
ZANDER  
MINOS SL1E /  
SL1D

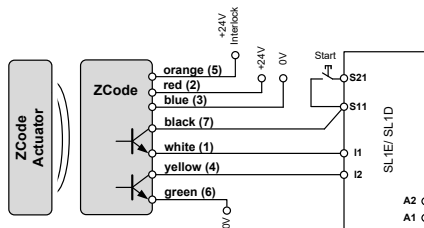


Fig. 9: Single connection of a ZCode to one ZANDER MINOS SL1D (up to category 3, PL d) / SL1E (up to category 4, PL e)

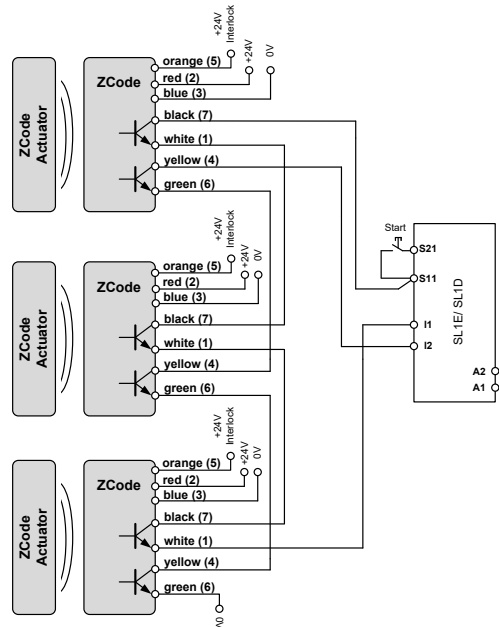


Fig. 10: Connecting of 3 (up to 15) ZCodes in series to one ZANDER MINOS SL1D / SL1E (up to category 3, PL d)

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

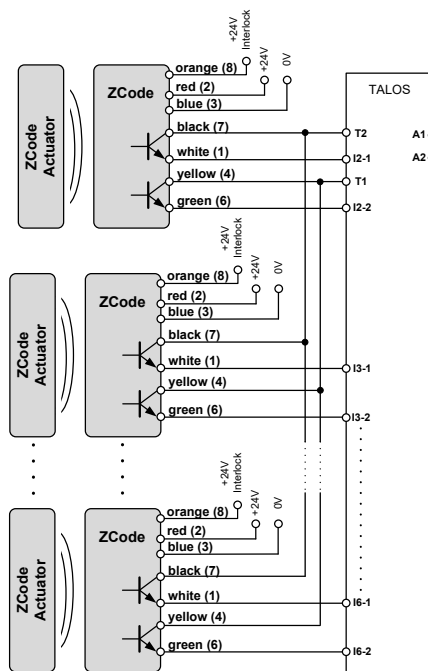


Fig. 11 : Connection of ZCodes to one ZANDER TALOS according to the configurations of the standard programs PR07 and PR08 (up to category 4, PL e)

### 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 interlock and actuator.

#### 2. Wiring:

Wire the interlock 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 interlock and safety device.

#### 4. Check your application:

After installation always check each interlock function by opening and closing each guard individually in turn. Ensure that the green LED at the interlock and also the respectively diagnostic LEDs of the safety device are lit and the yellow LED at the interlock is extinguished while the door is closed. Likewise ensure that that the green LED at the interlock and also the respectively diagnostic LEDs of the safety device are extinguished and the yellow LED at the interlock is lit while the door is open.

#### 5. Triggering safety function:

Check that the machine stops and cannot be re-started when an interlock 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 interlock function by opening and closing each guard individually in turn and ensure that the green LED on the interlock and the appropriate LED's on the safety relay or control device are illuminated and the yellow LED on the interlock is extinguished when the interlock is closed. Likewise ensure that that the green LED at the interlock and also the respectively diagnostic LEDs of the safety device are extinguished and the yellow LED is lit while the interlock is open.

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

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

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

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### 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.

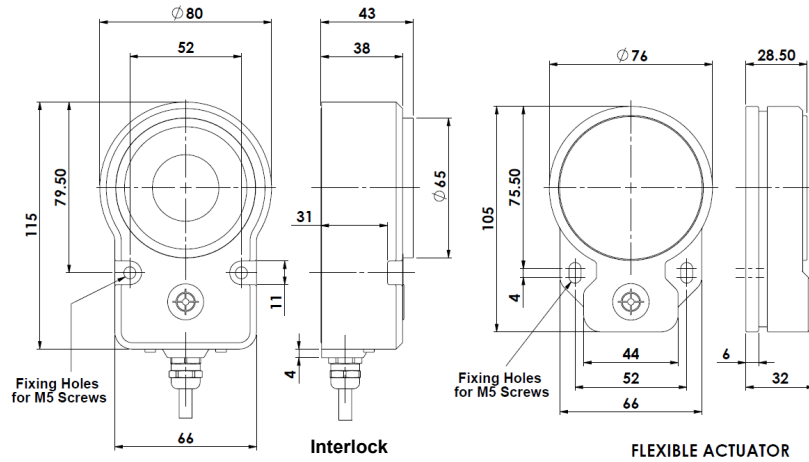
#### Safety Characteristics according to DIN EN ISO 13849-1 / EN 62061

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

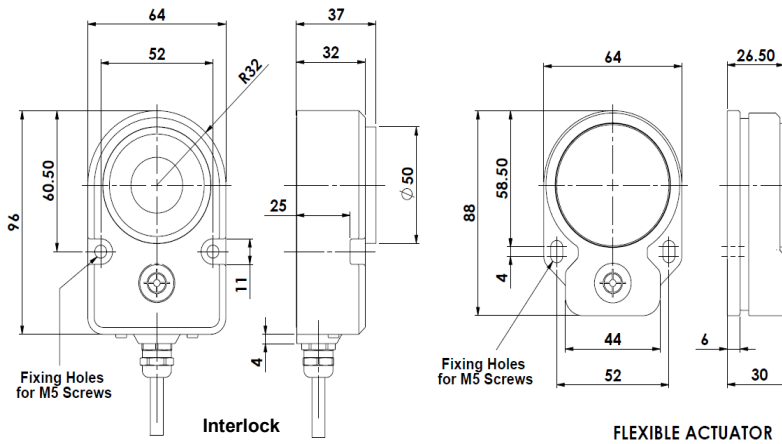
### Techn. Data

Corresponds to the standards	EN 60204-1; EN ISO 13849-1; EN 60947-5-3; EN ISO 14119, UL 508; 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)
Dielectric withstand	AC 250 V
Solenoid center offset	5 mm
Switching distance, max.	Sao 1 mm close / Sar 10 mm open
Switching frequency	Max. 1.0 Hz
Approach speed	200 mm/min - 1000 mm/s
Body material	MZ: plastic, MZA: die cast aluminum (upon request), MZE: stainless steel 316
Protection	IP67, IP69K (stainless steel)
Temperature range	-25°C to +40°C
Mounting	Each 2 x M5 screws; tightening torque max. 2 Nm
Cable	PVC 8 core, 6 mm OD
Weight	Depending on casing and holding force e.g. stainless steel, medium holding force approx. 1700 g (incl. 5 m cable)

### Dimensions



ZCode-MZx-Sx, dimension for the variants with heavy duty holding force



ZCode-MZx-Lx, dimension for the variants with medium duty holding force

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

### Variants & Accessories

#### 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, 10 m lengths, female, 8-wire, open end cable
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Die-Cast aluminium housing available upon request.

### **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:

<b>2006/42/EG</b> : Maschinenrichtlinie 2006/42/EG : Machinery directive	<b>2011/65/EU:</b> RoHS Richtlinie 2011/65/EU: RoHS directive
<b>2014/30/EU</b> : 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:

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

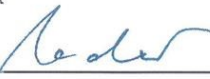
**Gemäß Zertifikat der benannten Stelle:**  
According to the certificate of the below mentioned organisation:

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

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

Dokumentationsbeauftragte/-r: Christiane Nittschalk  
Documentation manager

Aachen, den 12.03.2019

  
Dipl.-Ing. Walter Zander  
Geschäftsleitung  
General Manager

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

FT.3-07/03