

# STEALTH RANGES

## INSTRUCTION MANUAL "5SSR24-P/S/F, OPTO2S"

### CONTACTLESS SAFETY SENSOR

### FOR MACHINE SAFETY GUARDS / DOORS

**Stand-alone**  
SIL 1, PL c without external safety box  
Up to SIL 3, PLE with external safety box



dry 2A potential-free contacts  
2 million maneuvers at full load  
50 million mechanical maneuvers

### OTHER PRODUCTS: FORCE 0 AND IP69K TOUCH BUTTON

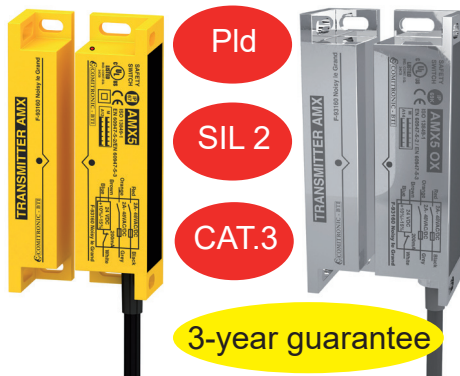


Made in France

new generation

### COMITRONIC-BTI THE LEADER IN STAND-ALONE SAFETY SWITCHES

contacts 2A/48V  
2 million operations at full load



Pld

SIL 2

CAT.3

3-year guarantee

# Contactless safety sensor, without polarity, autonomous, with direct control of dangerous movement

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## 1. Informations

For dry contact safety components, the average time of dangerous failure (MTTFd) depends on the nature of the load being switched. Software can be used as an aid in the development of the safety file. Under no circumstances does this software permit the publication of the said file; instead, they should be considered more like "ISO 13849-1 calculators."

Be aware of the B10d value, which must be listed with the corresponding load. In most cases, the manufacturers give a B10d for a low current, such as 10 mA; this is the case for the reed switch, for example. In reality, this current is much higher. If the value of the B10d is very high for 10 mA, it will be much lower at 100 mA and far too low at 1 A. In this case, the MTTFd value will drop significantly and the performance level of the installation will be compromised. The results published by some software program should therefore be taken lightly!

### **1.1 "Reed contact" technology**

The usual notation is B10d at 20% of the rated current ( $I_n$ ). If  $I_n = 50$  mA, then B10d is rated at 10 mA. This means that it is not possible to switch more than 10 mA with this component. Some software will require the correction of this parameter.

Before choosing a component, check that the nature of the load to be switched corresponds to 20% of  $I_n$ .

### **1.2 ACOTOM technology®**

The dry contacts of component X5 have an 8 A breaking capacity limited to 1/4 of its value to avoid any risk of sticking by carbonization. The value of the B10d is clearly displayed at 2 A with 2,000,000 cycles, which makes it possible to directly control power contactors.

**SYTCOM software:** <https://www.comitronic-bti.fr/fr/sytcom>

A calculator for ISO 13849-1

# Associated locking devices for guards: ISO 14119

## 1. The different locking devices according to ISO 14119

Locking devices for dangerous machinery guards are subject to ISO 14119. There are three component technologies:

Technologies	Device	Power switch				Sensor	
		Roller	Hinge	key	Reed	ACOTOM®	RFID
1	Mechanical	X	X	X			
2	Magnetic				X	X	
3	Induction or RFID						X
Standard ISO 14119	Type	1	1	2	3 4	4	4

## 2. Comparative technologies

Product	Type	Level of coding	Method of mounting	Possibility of assembly			Direct control of movement	Agro compatible
				Summary	Hidden	Embedded		
roller switch	1	None	Tamper-proof screws or Removable screw	No	Yes	No	Yes	No
hinge switch	1	none		Yes	Yes	No	Yes	No
key switch	2	low		Subject to conditions	No	No	Yes	No
reed switch	3 or 4	low		Yes	Yes	No	No	low to high
ACOTOM® process	4	low to medium		Yes	Yes	Yes	Yes	high
induction sensor	3	low		Yes	No	No	Subject to conditions	No
transponder sensor	4	low to medium		Yes	No	No	Subject to conditions	No
RFID SENSOR	4	high		Yes	No	No	Subject to conditions	No

Notes: The sensor equipped with the process ACOTOM®<sub>3</sub> is the only one that can be embedded in the door and in the frame, even if the material is stainless steel or aluminum. This makes the sensor totally invisible. Several forms of boxes are available, including an INOX M30 IP 69K version.

The sensor with the process ACOTOM® which is the only one that has a magnetic hold up to 4 Kg: this is the BOSTER.

Since 2006, some of our sensors have a screw cover for invisible mounting and additional protection.

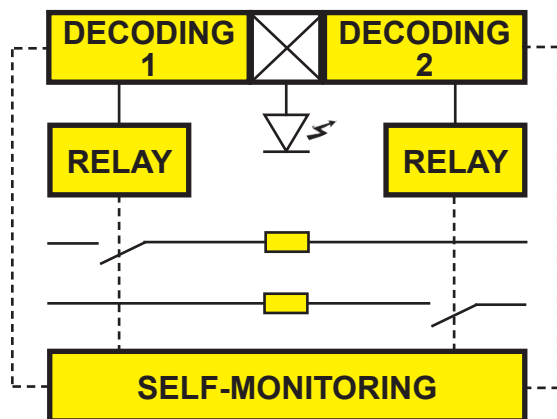
# Associated locking devices for guards: ISO 14119

## 3. The ACOTOM® process

### 3.1. The birth of a revolutionary technology

We put the first contactless encoded security sensor with a revolutionary process on the market in 1993. It uses a double-coded magnetic field and a diagnostic output, independent of the safety contacts, which traces the product's position. Today, this device is still leading thanks to many benefits that remain unmatched to date; it is called the "ACOTOM process®3".

### 3.2. Principle of the ACOTOM®3 process



!!! SD: Safety distance !!!

SD is the safety distance for the positioning of a door relative to the dangerous movement.

The system consists of:

- Two inviolable and independently coded magnetic field detectors (redundancy)
- A hysteresis control circuit at 2 mm
- A circuit that guarantees a distance of less than 14 mm, for the prevention of the passage of the fingers
- An automatic periodic safety check
- Protection of the safety contacts at 1/4 of their breaking capacity to avoid any sticking
- An LED which indicates that the decoding is done, without any anomaly
- A diagnostic output that indicates an error or that the door is not in the closed position
- Serialization up to 65 sensors without loss of performance level
- Direct control of dangerous movement without using an intermediate safety box, with PL d and SIL 2.

### 3.3. Benefits of the process ACOTOM®3

Criteria	Sensor with ACOTOM®3	Reed switch	Mechanical key switch	RFID sensor OSSD
Distance with ON action	8 mm	5 mm	5 mm	Depends on the environment ~ 20 mm
Distance with OFF action	10 mm	15 to 20 mm	10 mm	Depends on the environment ~ 20 mm
Direct drive of movement	Yes pilot duty 2A/50V AC/DC	No	Yes pilot duty 2A/50V AC/DC	Subject to conditions otherwise external safety module DC: 50mA~250mA
Independent diagnostic output	Yes + LED	No	No	Yes + LED
Tolerance to misalignment	High	Average (unsuitable for sliding doors)	Weak (risk of damage)	High
DS (indicative) Finger protection	320 mm Yes	490 mm No	330 mm No	650 mm Possible

# Miscellaneous information

## Safety sensors and RFID technology

### 1. RFID technology

#### 1.1. Why?

The RFID in the safety sensors is of interest if you need to have a different code for each guard, on each machine, and, in particular, for the sensors placed on the outside of the machines, or thus accessible. According to ISO 14119, RFID coding must be classified as "high". Pay close attention because some RFID security sensors have a "low" coding level, when they are provided with a unique code\*; this makes no difference in our "ACOTOM process®3". The standard does not impose a particular solution; it depends on the needs of the application, or remains at the customer's discretion.

\*Note: this unique coding requires code management and generates an additional workload for the maintenance and purchasing departments.

#### 1.2 Disadvantages

- RFID is a radio frequency technology and therefore the security component cannot be concealed behind a metal wall or embedded in the equipment. They are exposed to the environment, which limits their scope. For example, they cannot be used in the agri-food industry.
- Safety sensors with RFID are often associated with OSSD safety contacts. This principle causes a delay in the safety (OFF position) which is most important. The impact on the design of the machine is real, and it is necessary to make or redo an evaluation of the safety distance to check whether the position of the access with respect to the dangerous movement should be modified.
- There are three types of components
  - Those with a unique code: no interest
  - Those whose code is fixed by construction
    - In the event one of the parts breaks, it is necessary to replace both parts
  - Those whose code is re-writable thanks to a special RFID key
    - In the event one of the parts breaks, we can replace that part only

#### 1.3 Our RFID "AXKEF Process" Solution

- XORF-SA10 or SA12: a detection distance of 12 mm (finger protection)
- XORF-SA25: a detection distance of 25 mm
- Delivery of an RFID key for erasing the code, as well as tamper-proof screws (from May 2018) and washers
- Automatic code programming (up to 16 million) through self-learning (AXKEF process): once installed, just close the door and the code is transferred. Then, the recording is locked.
- Different code each time or unique code upon request
- XORF-SA2: stand-alone component SIL 2/PL d, with OSSD 500 mA safety contact

### AXKEF

The solution for having a different code for each guard and on each machine

**WITHOUT CODE MANAGEMENT  
BY PURCHASING OR MAINTENANCE**

# Contactless safety sensor, with three potential-free contacts 5SSR24-P and 5SSR24-S



## 1. Benefits

- Controls the opening of doors and movable guards on dangerous machines
- Robust product for the industrial environment
- 2 NO contacts and one NC contact, free of potential, 250V / 2A
- Two-colored diagnostic LED: red = inactive, green = active
- Acotom coding®: embedded mounting possible (behind a 3mm wall, stainless steel, aluminum)
- Connection to M12/8p connector compatible with T-SPLITTER (P version)
- Direct control of dangerous movement

## Item code

5SSR24-□-□----- MKT220: PUR 220cm M12 cord connection

P: parallel NC contact  
 S: NC contact series  
 F: RFID coding with self-learning

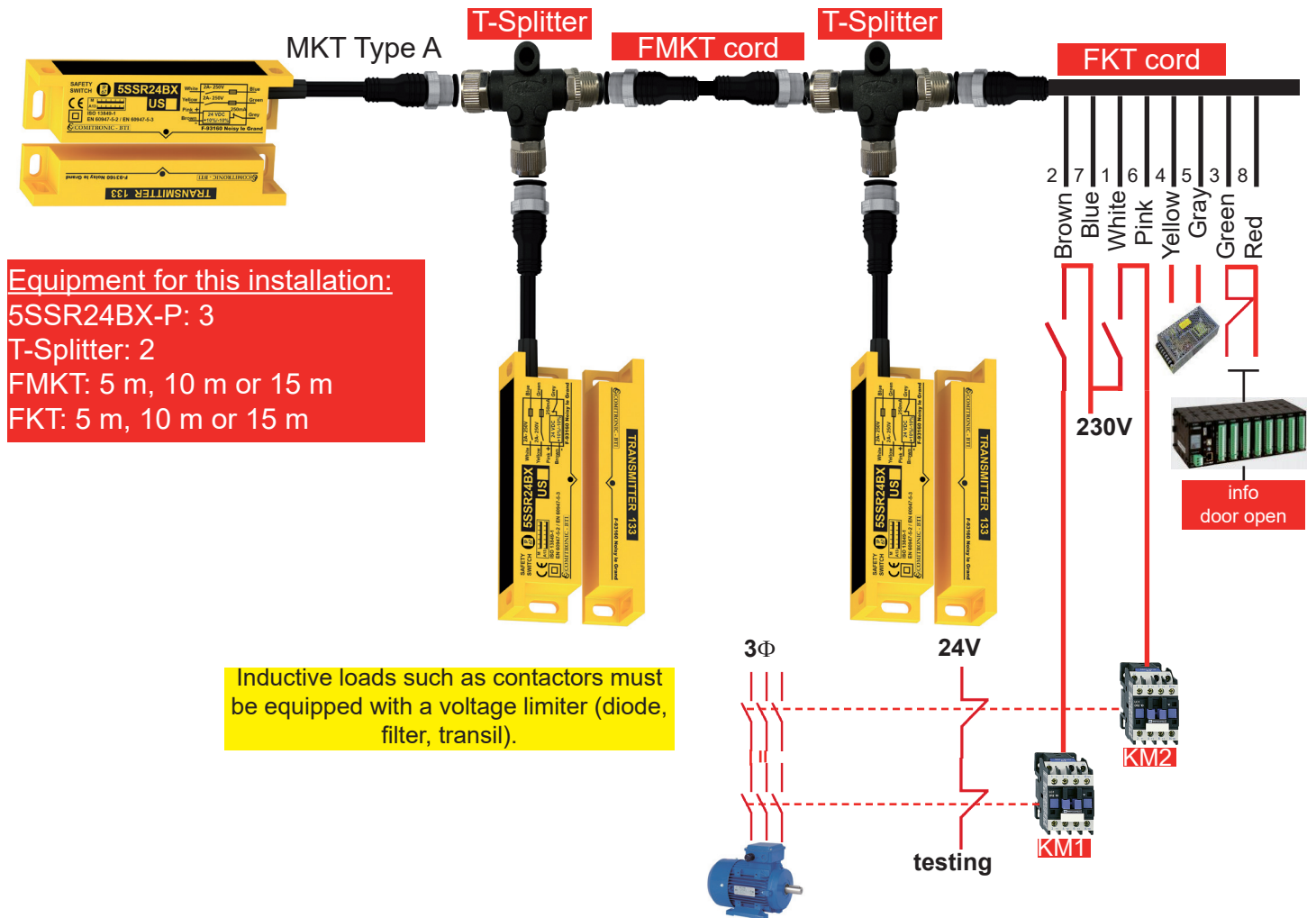
## 2. Features

Power supply IEC 60204-1 : PELV/SELV	24 VAC +/- 25% 50-60Hz 24 VDC +/- 25%
Operating current	50 mA (DC) / 115 mA (AC): maximum values
Protection Class	Protection II, Pollution 3
Room temperature	-30°C to +80°C (-22° to +176° F)
Protection Class	IP 68
Vibration resistance	10~55 Hz, 1 mm double amplitude
Shock resistance	30 g, 11 ms
Frequency switching	< 10 Hz
Response time	<5ms (Ton)
Risk period	<5 ms (Toff)
NO Safety line NC Auxiliary line	AC1-AC15-DC13: 250 VAC / 2 A (5 VDC/10 mA minimum)
Indicator	Two-color indicator red / green
Protection of contacts	Internal fuse protection
Detection Distance transmitter/receiver (IEC 60947-5-3)	Sn = 12 mm (working distance) Sao=10 mm (ensured activation distance) Sar=15 mm (ensured rupture distance) Hysteresis 3 mm, Repeatability <5%
Classification	M3D25AU2
Weight	Transmitter: 66 g and Receiver: 150 g

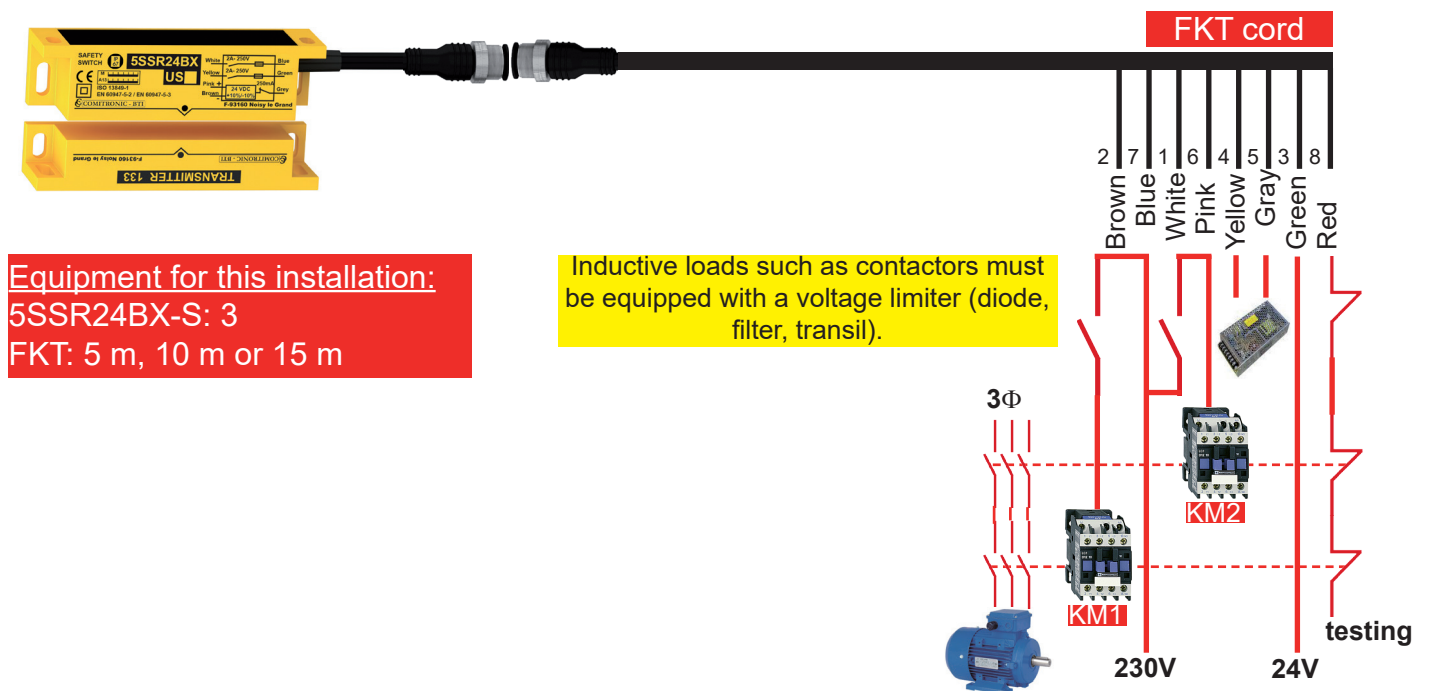


# Contactless safety sensor, with three potential-free contacts 5SSR24-P and 5SSR24-S

## 3. Principle of a 5SSR24-P installation for a PLC performance level



## 4. Principle of a 55SSR24-S installation for a PLC performance level



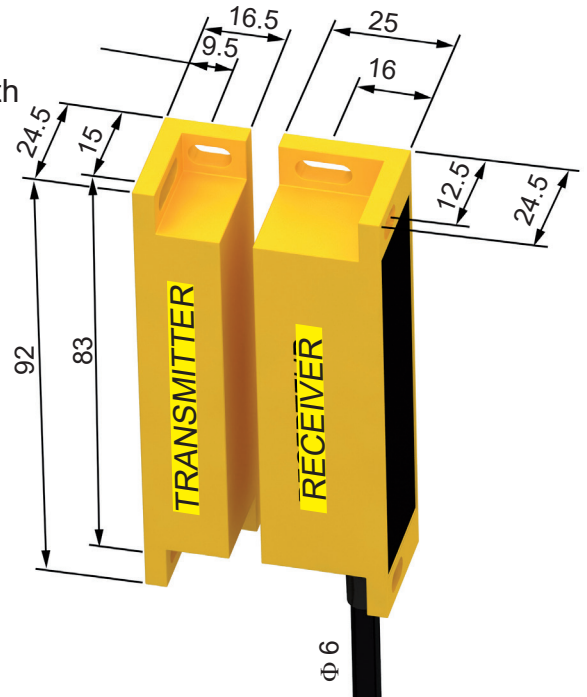


# Contactless safety sensor, with three potential-free contacts 5SSR24-P and 5SSR24-S

## 5. Assembly instruction

- a) Drill the holes of the mounting bracket at  $\Phi = 4.5$  mm, with a center distance of 83 mm
- b) Use stainless steel BH4 tamper-proof screws supplied with product
- c) It is important to use the stainless steel washers supplied with the product.
- (d) Once the door or casing is closed, the distance between the transmitter and the receiver must be at least 1 mm. This product should never be used as a mechanical stop.
- e) Each element cannot be hidden behind a metal wall with a thickness of 3 mm
- f) The bending radius of the cable must be greater than 50 mm.
- g) Connect the M12 cord(s)
- h) Test the installation

## 6. Dimensions



## 7. Recommendations

Protect the cable against external damage by using, for example, a mechanical shield (tube, mesh, etc.). Keep a minimum gap of at least 1 mm between the transmitter and the receiver. These two parts should not be used as mechanical stops.

## 8. Periodic inspection

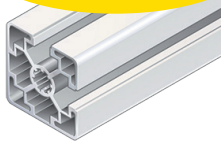
This product should be checked periodically at least once a year. To do this, simply execute a procedure and record the results on a form. The following points must be checked:

Example of an assembly on a door:

- Move the transmitter 12 mm
- Observe that the LED lights up red
- Check that contacts 1-6 and 2-7 are open
- Check that contacts 3-8 are closed
- Approach the transmitter at 8 mm
- Observe that the LED lights up green
- Check that contacts 1-6 and 2-7 are closed
- Check that contacts 3-8 are open
- Close access

# Contactless safety sensor, with three potential-free contacts 5SSR24-F

25 x 25 aluminum profile  
aluminum profile 30 x 30  
aluminum profile 35 x 35



3 redundant contacts  
250V/2A  
LED diagnostics

Connection  
M12/8p

Suitable for standard applications  
of machine safety  
IEC 62061: SIL 1  
ISO 13849-1: PL c



New item  
2018

## 1. Benefits

- Controls the opening of doors and movable guards on dangerous machines
- Compatible with 25 x 25, 30 x 30, 35 x 35 grooved profiles
- Robust product for the industrial environment, screw cover for a smooth surface
- 2 NO contacts and one NC contact, free of potential, 250V / 2A
- Two-colored diagnostic LED: red = inactive, green = active
- RFID coding with self-learning (discriminant or unique code on request)
- Connection to M12/8p connector compatible with T-SPLITTER
- Direct control of dangerous movement

## Item code

5SSR24-□-□----- MKT220: PUR 220cm M12 cord connection

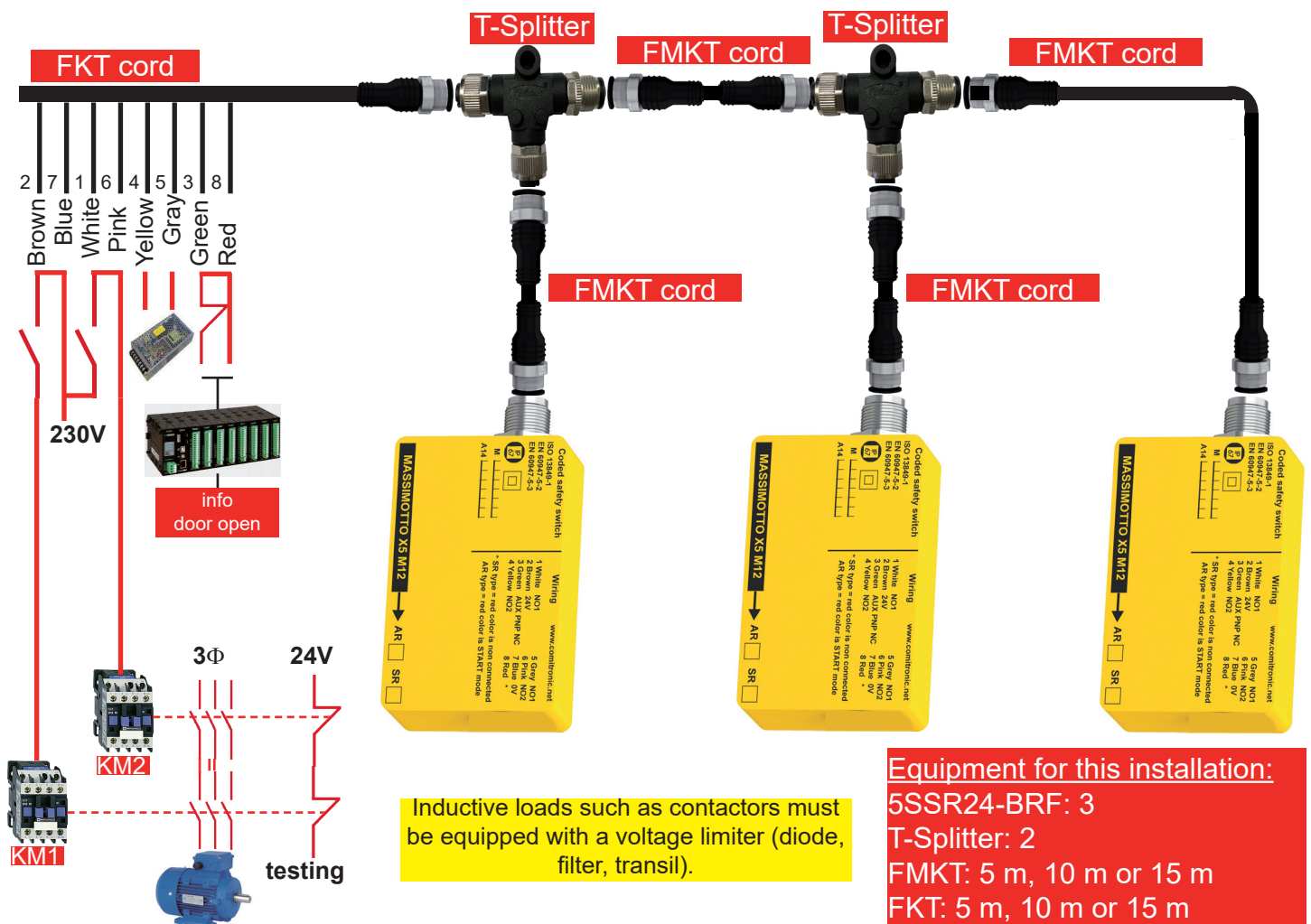
P: parallel NC contact  
 S: NC contact series  
 F: RFID coding with self-learning

## 2. Features

Power supply IEC 60204-1 : PELV/SELV	24 VAC +/- 25% 50-60Hz 24 VDC +/- 25%
Operating current	50 mA (DC) / 115 mA (AC): maximum values
Protection Class	Protection II, Pollution 3
Room temperature	-30°C to +80°C (-22° to +176° F)
Protection Class	IP 68
Vibration resistance	10~55 Hz, 1 mm double amplitude
Shock resistance	30 g, 11 ms
Frequency switching	1 Hz max.
Response time	150 ms (Ton)
Risk period	20 ms (Toff)
NO Safety line NC Auxiliary line	AC1-AC15-DC13: 250 VAC / 2 A (5 VDC/10 mA minimum)
Indicator	Two-color indicator red / green
Protection of contacts	Internal fuse protection
Detection Distance transmitter/receiver (IEC 60947-5-3)	Sn = 12 mm (working distance) Sao=10 mm (ensured activation distance) Sar=15 mm (ensured rupture distance) Hysteresis 3 mm, Repeatability <5%
Classification	M3D25AU2
Weight	Transmitter: 66 g and Receiver: 150 g

# Contactless safety sensor, with three potential-free contacts 5SSR24-F

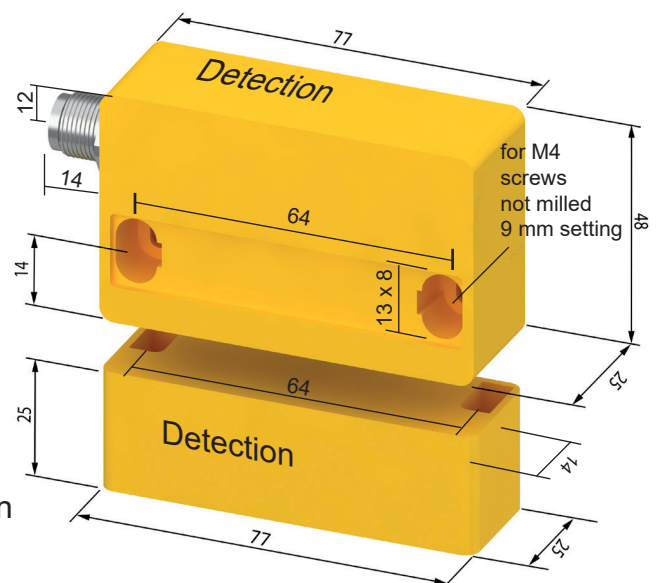
## 3. Principle of a 5SSR24-F installation for a PLC performance level



## 4. Assembly instructions

- Drill the holes of the mounting bracket at  $\Phi = 4.5$  mm, with a center distance of 64 mm
- Use stainless steel BH4 tamper-proof screws supplied with the product
- It is important to use the stainless steel washers supplied with the product.
- Once the door or casing is closed, the distance between the transmitter and the receiver must be at least 1 mm. This product should never be used as a mechanical stop.
- This product cannot be concealed behind a metal wall
- The bending radius of the cable must be greater than 50 mm.
- Connect the M12 cord(s)
- After assembly and test, fit the screw cap

## 5. Dimensions



# Contactless safety sensor, with three potential-free contacts 5SSR24-F

## **6. Product configuration**

Perform the pairing: during the first installation, the transmitter transfers its code to the receiver which permanently memorizes it. Erasing the code is, however, possible with a special card and option. After deletion, the receiver is in the "learning" mode, as during the first installation.

## **7. Recommendations**

Protect the cable against external damage by using, for example, a mechanical shield (tube, mesh, etc.). Keep a minimum gap of at least 1 mm between the transmitter and the receiver. These two parts should not be used as mechanical stops.

## **8. Periodic inspection**

This product should be checked periodically at least once a year. To do this, simply execute a procedure and record the results on a form. The following points must be checked:

Example of an assembly on a door:

- Move the transmitter 15 mm
- Observe that the LED lights up red
- Check that contacts 1-6 and 2-7 are open
- Check that contacts 3-8 are closed
- Approach the transmitter at 8 mm
- Observe that the LED lights up green
- Check that contacts 1-6 and 2-7 are closed
- Check that contacts 3-8 are open
- Close access

# Contactless safety sensor, with two potential-free contacts OPTO2S

Miniature  
ultra-compact

2 Redundant contacts  
48V/250mA  
LED diagnostics

Suitable for standard applications  
of machine safety  
IEC 62061: SIL 1  
ISO 13849-1: PL c



## 1. Benefits

- Controls the opening of manholes and small guards on dangerous machines
- Small-sized product for integration in areas with narrow access
- 2 NO potential-free contacts, 48 V / 250 mA and auxiliary output PNP 250 mA
- Diagnostics LED: lit = decoding complete and activation of the safety contacts
- Cable connection in standard 3m, 6m 12m. Other lengths available upon request.
- Direct control of dangerous movement

## Item code

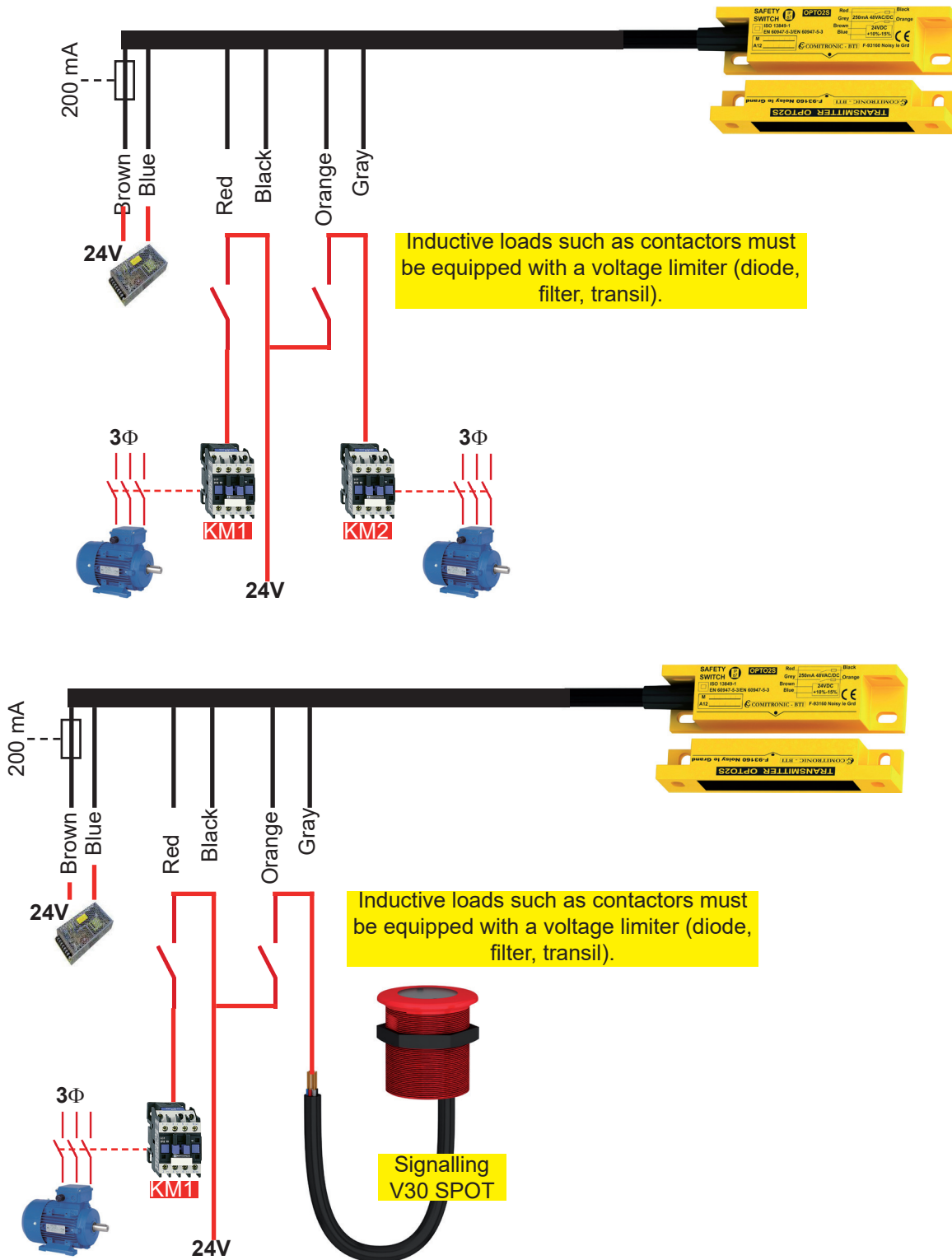
OPTO-2S-□----- 3m: cable length of 3 meters  
6m: cable length of 6 meters  
12m: cable length of 12 meters

## 2. Features

Power supply	12 VDC - 15% to +10% 24 VAC/DC - 15% to +10% 50-60 Hz
Operating current	10-53 mA(dc) / 60 mA-150 mA(ac)
Protection Class	Protection II, Pollution 3
Room temperature	-20°C / +60 °C (-4°/+140° F)(dc) +40 °C (+104°F)(ac)
Protection Class	IP 68
Vibration resistance	10~55 Hz, 1 mm double amplitude
Shock resistance	30 g, 11 ms
Frequency switching	< 10 Hz
Response time	5ms (Ton)
Risk period	5 ms (Toff)
NO Safety line NC auxiliary output	250 mA / 48V resistive load 250 mA PNP
Indicator	LED light
Protection of contacts	Internal fuse protection
Detection Distance transmitter/receiver (IEC 60947-5-3)	Sn = 7 mm (working distance) Sao=6 mm (ensured activation distance) Sar=10 mm (ensured rupture distance) Hysteresis 3 mm, Repeatability <5%
Classification	M3C16AU1
Weight	Transmitter: 25 g and Receiver: 35 g

# Contactless safety sensor, with two potential-free contacts OPTO2S

## 3. Installation principle for a PLc performance level



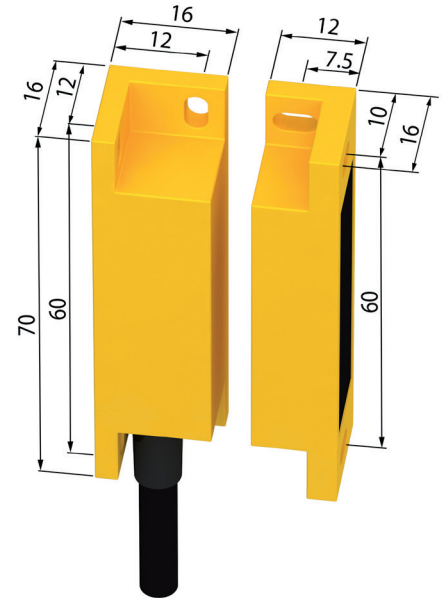


# Contactless safety sensor, with two potential-free contacts OPTO2S

## 4. Assembly instructions

- a) Drill the holes of the mounting bracket at  $\Phi = 3.5$  mm, with a center distance of 60 mm
- b) Use optional stainless steel BH3 tamper-proof screws
- c) It is important to use the stainless steel washers supplied with the product.
- d) Once the door or casing is closed, the distance between the transmitter and the receiver must be at least 1 mm. This product should never be used as a mechanical stop.
- e) This product can be concealed behind a metal wall of 2 mm thickness
- f) The bending radius of the cable must be greater than 50 mm.
- g) Connect the cable
- h) Test the installation

## 5. Dimensions



## 6. Recommendations

Protect the cable against external damage by using, for example, a mechanical shield (tube, mesh, etc). Keep a minimum gap of at least 1 mm between the transmitter and the receiver. These two parts should not be used as mechanical stops.

## 7. Periodic inspection

This product should be checked periodically at least once a year. To do this, simply execute a procedure and record the results on a form. The following points must be checked:

Example of an assembly on a door:

- Move the transmitter 10 mm
- Observe that the LED turns off
- Check that the red/black and orange/gray contacts are open
- Approach the transmitter at 7 mm
- Observe that the LED lights up
- Check that the red/black and orange/gray contacts are closed
- Close access

# 5SSR series and OPTO2S DECLARATION OF CONFORMITY



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www.comitronic-bti.net



## EU DECLARATION OF CONFORMITY

This document is the conformity declaration concerning safety switches and relays, conforming to the  
Machine Directive 2006/42/CE,  
EMC Directive 2014/30/UE, RoHS2 Directive 2011/65/EU

### SAFETY SWITCHES

We hereby certify that the herein described safety components, both in their basic design and construction, conform to the applicable European Directives.

Range	Classification IEC 60947-5-2	Safety Standards	Information	B10d	PFh
5SSR24-P-MKT220 5SSR24-S-MKT220 OPTO2S	M3C25AU2 M3C25AU2 M3C16AU1	EN 62061 ISO 13849-1 IEC 60947-5-3 IEC 60204-1 ISO 14119	SIL 1 PL c PDDb+EMC PELV/SELV TYPE 4: low	2 000 000 2 000 000 400 000	1,14.10 <sup>-6</sup>

Test interval = at least 1/year  
TM = 20y

Note: All standards cover transmitter and receiver

#### Description:

Coded safety switch with Acotom process® to detect the position of the doors. It can be used without safety relay.

Person authorized for the compilation of the technical documentation :

Christophe Pays  
34 Allée du Closeau  
93160 Noisy le Grand

Place and date of issue: Noisy, Nov. 6, 2017

Authorized signature  
Michel Conte  
Director





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