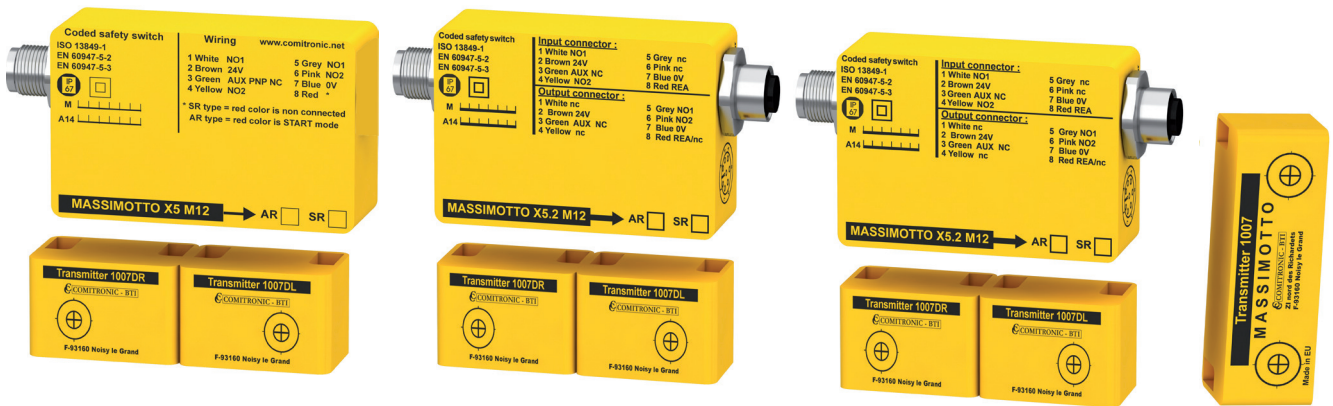


Instruction manual MASSIMOTTO SERIES CONTACTLESS SAFETY SENSOR FOR PROTECTORS / MACHINE DOORS



OTHER PRODUCTS : FORCE 0 AND IP 69K TOUCH PUSH BUTTON



COMITRONIC-BTI THE LEADER IN STAND-ALONE SAFETY SWITCHES

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



Contactless safety sensor, without polarity, stand alone, with direct control of dangerous movement

CONTENTS

B10d: Beware of being trapped	3
1. Informations	3
1.1 "Reed contact" technology	3
1.2 ACOTOM® technology	3
Associated locking devices for guards : ISO 14119	4
1. The different locking devices according to ISO 14119	4
2. Comparative technologies	4
3. The process ACOTOM®	5
3.1. The birth of a revolutionary technology	5
3.2. Principle of the process ACOTOM®3	5
3.3. Benefits of the process ACOTOM®3	5
MASSIMOTTO X5-485	6
1. Benefits	6
2. Features	6
3. Installation Principle for PLe/SIL3 with T-Splitter	7
4. Configuring a ModBus RTU network with two sensors	8
4.1 Request the status of a sensor	8
4.2 Change the address of a sensor	8
4.3 Reset a sensor	8
MASSIMOTTO X5.2	9
1. Benefits	9
2. Features	9
3. Installation Principle for PLd/SIL2 with Manual Reset	10
4. Installation Principle for PLd/SIL2 with automatic reset	10
MASSIMOTTO-X5	11
1. Benefits	11
2. Features	11
3. Installation Principle for PLd/SIL2 with Manual Reset	12
4. Installation Principle for PLd/SIL2 with Automatic Reset	12
5. ASSEMBLY INSTRUCTION	13
6. DIMENSIONS of sensors "X5-D" and "X5-485-D"	13
7. DIMENSIONS of sensors "X5-S" and "X5-485-S"	13
8. DIMENSIONS of sensors "X5.2-D" and "X5.2-S"	13
9. Recommendations	14
10. Periodic inspection	14
DECLARATION OF CONFORMITY	15

B10d : Beware of being trapped

1. Informations

For safety components with relay contact, the average time before dangerous failure (MTTFd) depends on the nature of the load to be switched. Software is used to assist in the development of the safety file. In no case can these software publish the said file, but rather they should be considered as "calculators of ISO 13849-1".

B10d value is to be listed with corresponding Load. In most cases, the manufacturers give a B10d for a low current, about 10 mA, the case of the reed switch for example. In reality, this current is much higher. If the value of the B10d is over 10 mA, it will be much lower at 100 mA and much too low at 1 A. In this case, MTTFd value will decrease strongly and the Performance Level of the installation will be compromised. The results published by some software are therefore to be taken with tweezers !

1.1 "reed contact" technology

The usual notation is B10d at 20% of the nominal current (I_n). If $I_n = 50$ mA, then B10d is given at 10 mA. This means that it is not possible to switch more than 10 mA by this component. Some software requires correction of this setting.

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

1.2 ACOTOM® technology

The contacts relays of component X5 have a breaking capacity of 8 A limited to 1/4 of its value to avoid any risk of bonding. The value of the B10d is clearly displayed at 2 A load with 2 000 000 cycles. The user can recalculate this value if other load and switching frequency are used in his application.

The system **ACOTOM®** allowing direct control of power contactors.

• The SYTCOM software: <https://www.comitronic-bti.fr/en/sytcom> is 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	No	Yes	No	Yes	No
hinge switch	1	none		Yes	Yes	No	Yes	No
key switch	2	low	or	Subject to conditions	No	No	Yes	No
reed switch	3 or 4	low	Removable screw	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®₃ 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.

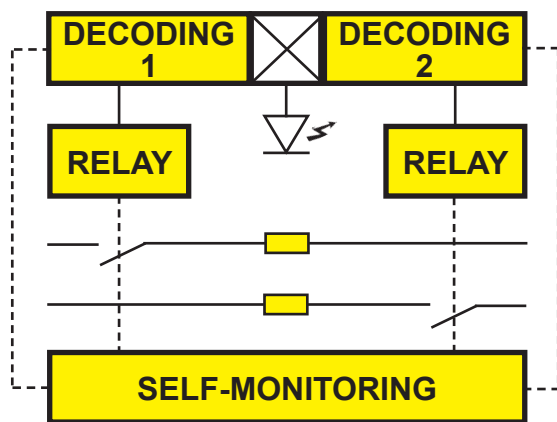
Associated locking devices for guards: ISO 14119

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 process®3



!!! 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 ACOTOM®3 process

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

Contactless safety sensor, without polarity, for serialization of up to 30 plug & play sensors: MASSIMOTTO-X5-485-S/D

Quick connection with the T-Splitter

Traceability Modbus RTU

Connection M12/8p

2 Redundant contacts Tricolor diagnostic LEDs

Self-monitoring integrated

Without visible screws: Screw cover

**Up to 30 sensors in series:
With external safety box = PLe/SIL3
Without external safety box = PLd/SIL2
Example of a security box: AWAX26XXL**

Special transmitter double-wing door

Special transmitter single-wing door

1. Benefits

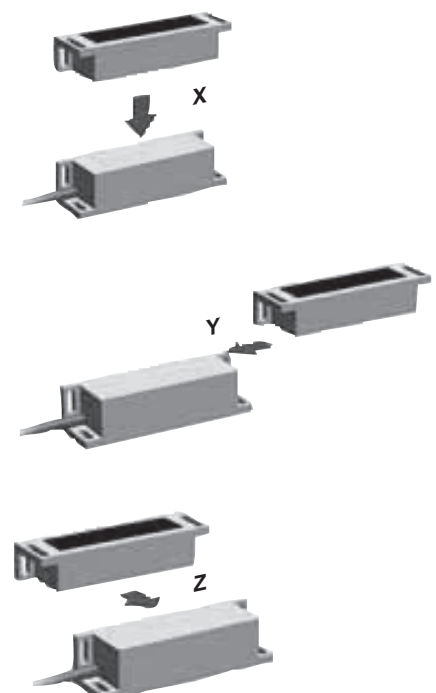
- 1 to 30 machine guards in plug & play connection thanks to the "T-Splitter"
- Invisible screws thanks to the screw covers
- Traceability/diagnostics on 2-wire Modbus RTU network
- Controls the opening of doors and movable guards on dangerous machines
- LED diagnostics: red = door open, green = door closed, orange = product or alignment fault
- Simple/fast/automatic/economical connection thanks to the T-Splitter
- Economical mounting for double-wing door with double transmitter: X5-485-D
- Economical mounting for single-wing door with single transmitter: X5-AR/SR-S
- Direct control of dangerous movement

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



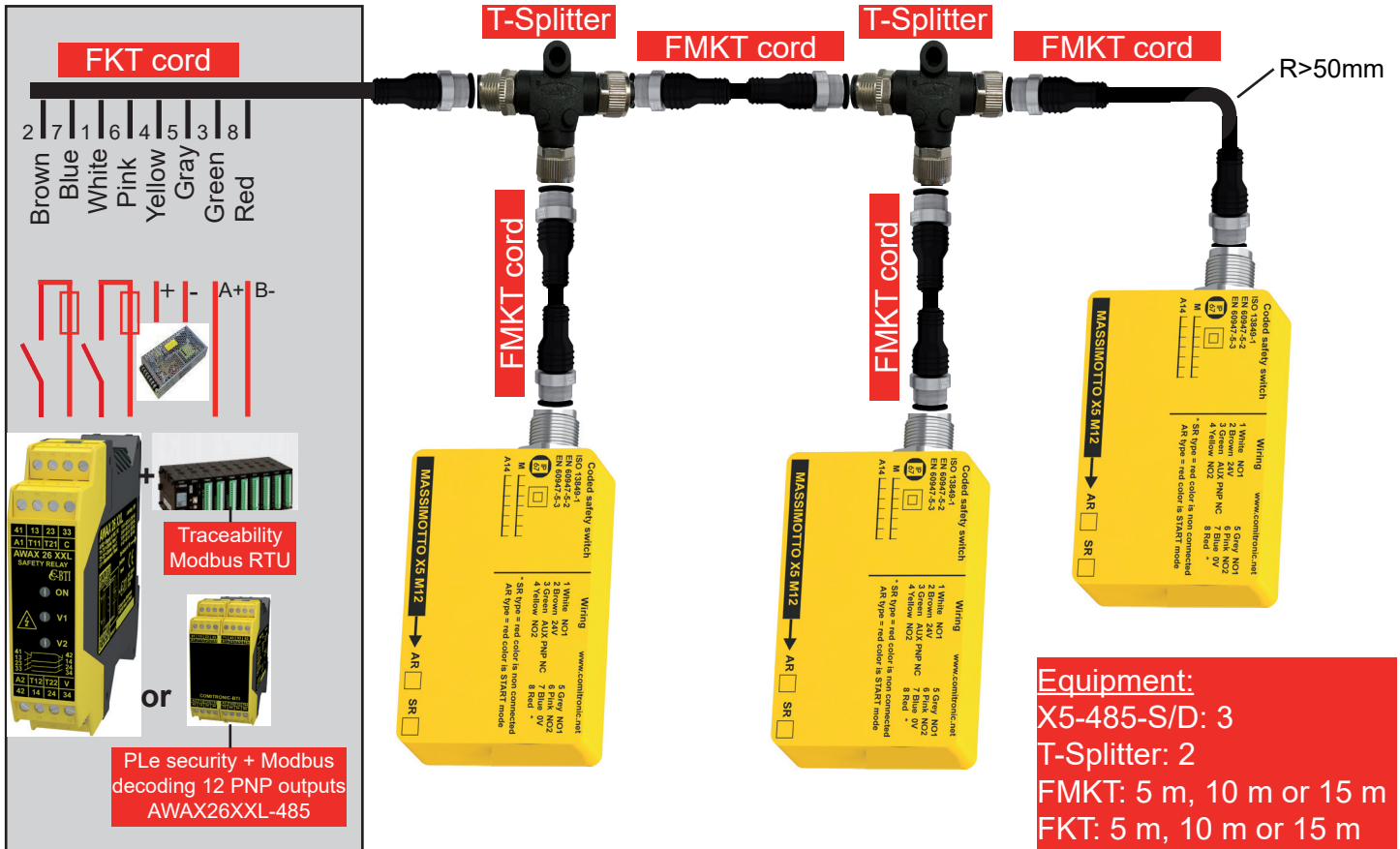
2. Features

Power supply IEC 60204-1 : PELV/SELV	24 VAC -15% / +10% 50/60Hz 24 VDC -15% / +10%
Operating current	50 mA (DC) / 115 mA (AC): maximum values
Protection Class	Protection II, Pollution 3
Room temperature	-25°C to +60°C (-13° to +140° F)
Protection class rating	IP 67
Vibration resistance	10~55 Hz, 1.5 mm double amplitude
Shock resistance	10 g
Frequency switching	< 2 Hz
Response time	< 400 ms (Ton)
Risk period	<15 ms (Toff)
Safety line	AC1-AC15-DC13: 50 VAC/DC / 2 A (5 VDC/10 mA minimum)
Auxiliary output	NC: 24 V / 250 mA general use
Traceability	RS485: ModBus RTU 2-wire A + / B-
Detecting distance (mm)	PA6 X sao=15.7, sar=17.4 PA6 Y sao=13.1, sar=15.9 PA6 Z sao=8.7, sar=8.8
Classification	M3D25AU2
Weight	Transmitter: 66 g and Receiver: 150 g



Contactless safety sensor, without polarity, for serialization of up to 30 plug & play sensors: MASSIMOTTO-X5-485-S/D

3. Installation Principle for PLe/SIL3 with T-Splitter



Contactless safety sensor, without polarity, for serialization of up to 30 plug & play sensors: MASSIMOTTO-X5-485-S/D

4. Configuring a ModBus RTU network with two sensors

The network consists of the T-Splitter. It is necessary to address each sensor. The RS485 link is used to transmit the Modbus protocol and its setting is 9600 Bds without parity

a) Connect the first sensor: write address no. 1

- LED flashing: the sensor has no address
- Send the data frame:
- The sensor sends the data frame: 00 06 00 01 00 01 +CRC
- LED off: the address is saved
- Check when the door is open: LED is off
- Check when the door is closed: LED is on

ID	write map	ID new	validity
00 06	00 01	00 01	CRC16

b) Connect the second sensor: write address no. 2

- LED flashing: the sensor has no address
- Send the data frame:
- Sensor response: 00 06 00 01 00 02 +CRC
- LED off: the address is saved
- Check when the door is open: LED is off
- Check when the door is closed: LED is on

ID	write map	ID new	validity
00 06	00 01	00 02	CRC16

4.1 Request the status of a sensor: sensor status no. 1

The PLC cyclically scans the network devices

- The PLC sends the data frame:
- Sensor response: door open 01 02 01 01 +CRC
- Sensor response: door closed 01 02 01 00 +CRC

ID	read map	word	validity
01 02	00 01	00 01	CRC16

11. Change the address of sensor no. 2 and no. 3

- Send the data frame:
- Sensor response: 02 06 00 01 00 03 +CRC

ID	write map	ID new	validity
02 06	00 01	00 03	CRC16

4.3 Reset a sensor: return to factory settings

- Send the data frame:
- Sensor response: 02 06 00 01 00 00 +CRC
- Check that the sensor LED is flashing

ID	write map	ID new	validity
02 06	00 01	00 00	CRC16

Non-contact safety sensor, without polarity, serialized up to 30 sensors : MASSIMOTTO-X5.2

Quick Connection
with the T-Splitter

Connection
M12 / 8p

Sensors
in serie

Auto control
integrated

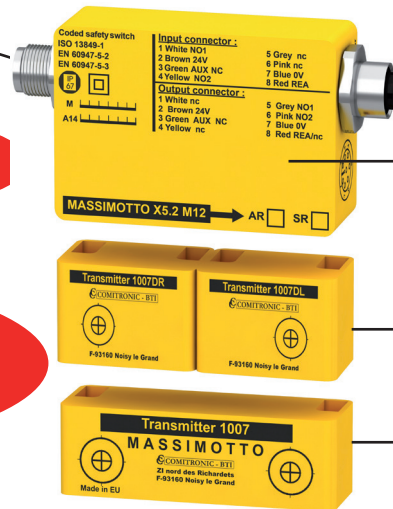
2 redundant contacts
Diagnostic LEDs

Without visible screw :
screw cover

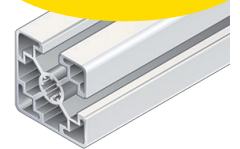
up to 30 sensors in series:
With external safety box = PLe / SIL3
Without external safety box = PLD / SIL2
Example of a safety box: AWAX26XXL

Special Transmitter
double door

Special transmitter
single door



Aluminium profil 25x25
Aluminium profil 30x30
Aluminium profil 35x35

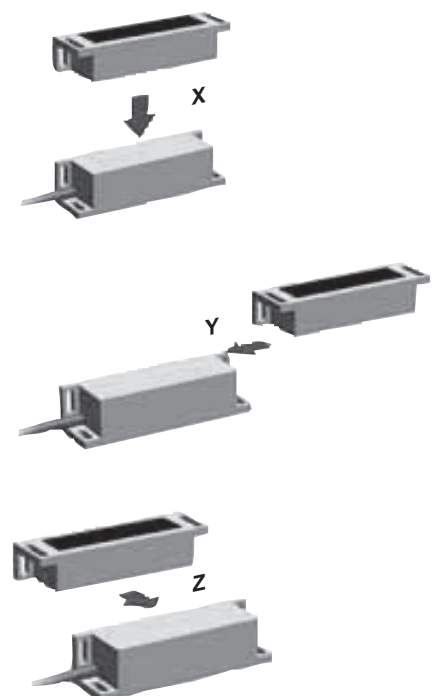


1. Benefits

- Manual reset input (AR version)
- Invisible screws with screw cover
- "Door open" diagnostic output
- LED diagnostics: orange = transmitter detected, operational product
- Controls the opening of doors and mobile protectors of dangerous machines
- Quick connection by M12 cable (FKT) and automatic series connection by M12 cable (FMKT)
- Economical installation for double door with dual transmitter: X5.2-AR / SR-D
- Economical installation for single-leaf doors with single transmitter: X5.2-AR / SR-S
- Direct control of dangerous movement

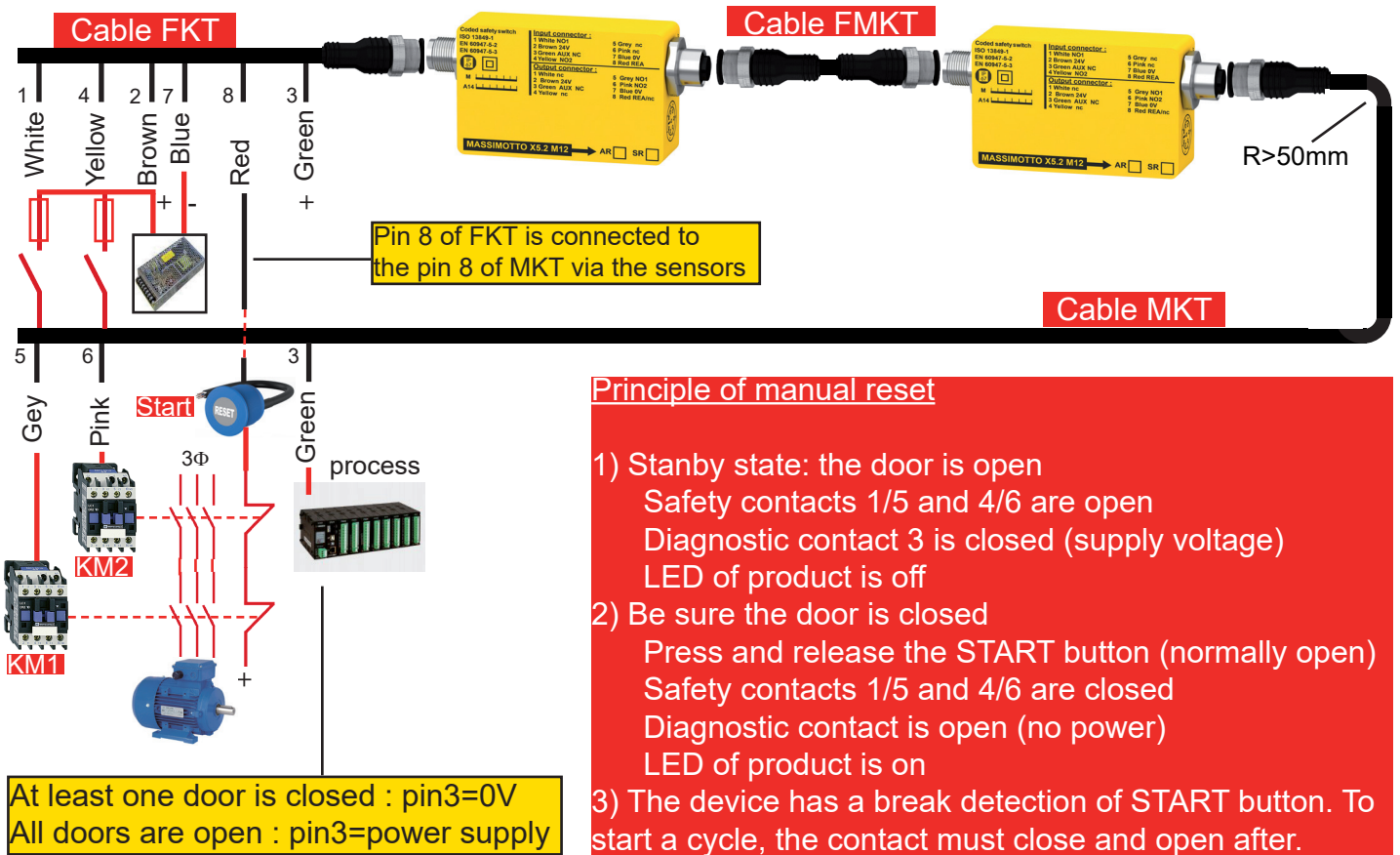
2. Specifications

Power supply IEC 60204-1 : PELV/SELV	24 VAC -15% / +10% 50/60Hz 24 VDC -15% / +10%
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Protection Class	Protection II, Pollution 3
Room temperature	-25°C to +60°C (-13° to +140° F)
Protection class rating	IP 67
Vibration resistance	10~55 Hz, 1.5 mm double amplitude
Shock resistance	10 g
Frequency switching	< 2 Hz
Response time	< 400 ms (Ton)
Risk period	<15 ms (Toff)
Safety line	AC1-AC15-DC13: 50 VAC/DC / 2 A (5 VDC/10 mA minimum)
Auxiliary output	NC: 24 V / 250 mA general use
Traceability	RS485: ModBus RTU 2-wire A + / B-
Detecting distance (mm)	PA6 X sao=15.7, sar=17.4 PA6 Y sao=13.1, sar=15.9 PA6 Z sao=8.7, sar=8.8
Classification	M3D25AU2
Weight	Transmitter: 66 g and Receiver: 150 g

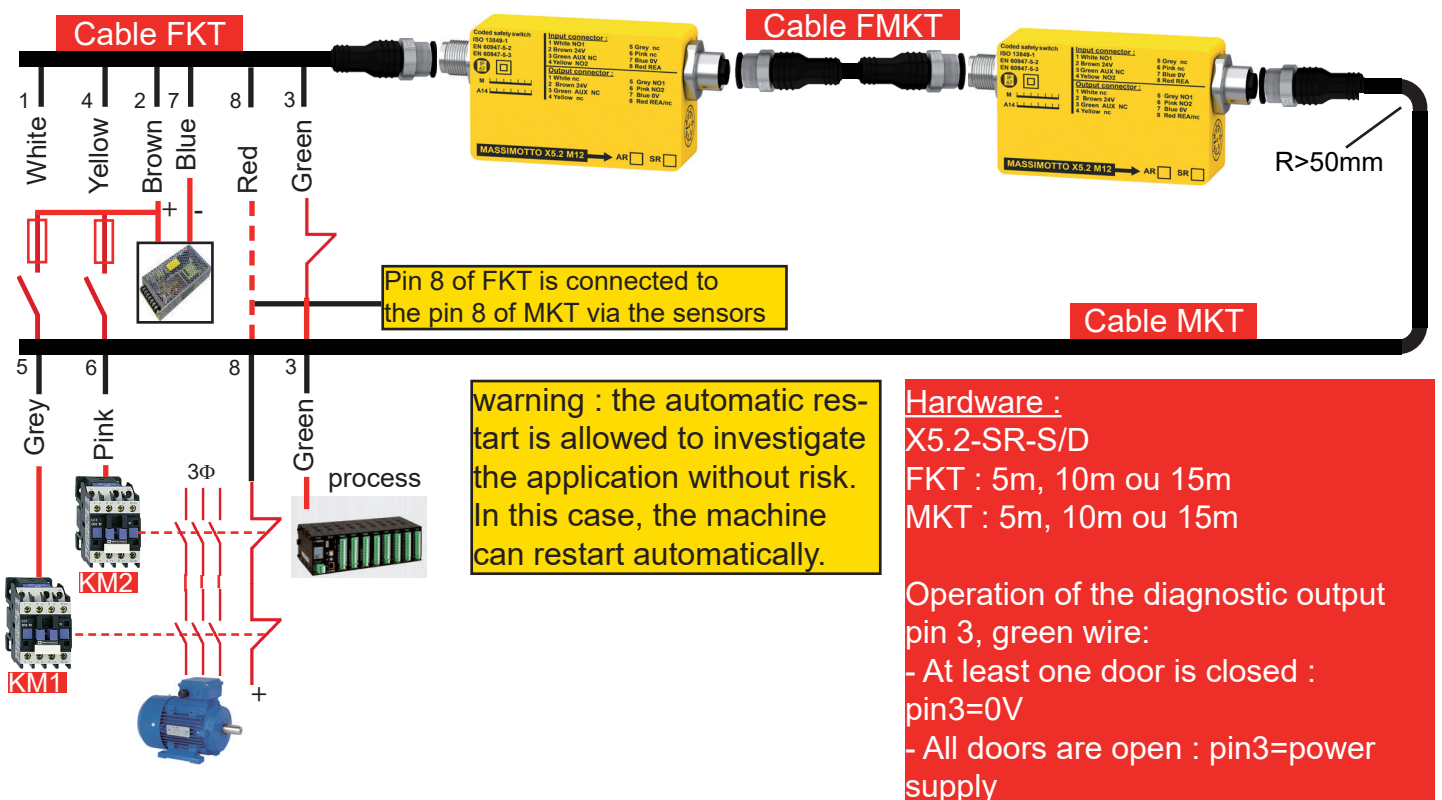


Non-contact safety sensor, without polarity, serialized up to 30 sensors : MASSIMOTTO-X5.2

3. Principle of a PLd / SIL2 installation with manual reset : X5.2-AR



4. Principle of a PLd / SIL2 installation with automatic reset : X5.2-SR



Non-contact safety sensor, without polarity MASSIMOTTO-X5

Quick Connection with the T-Splitter

Connection M12 / 8p

2 redundant contacts Diagnostic LEDs

Auto control integrated

Without visible screw : screw cover

Special Transmitter double door

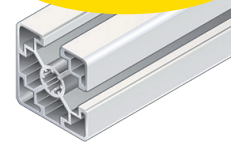
Special transmitter single door

up to 30 sensors in series:
With external safety box = PLe / SIL3
Without external safety box = PLd / SIL2
Example of a safety box: AWAX26XXL

1. Benefits

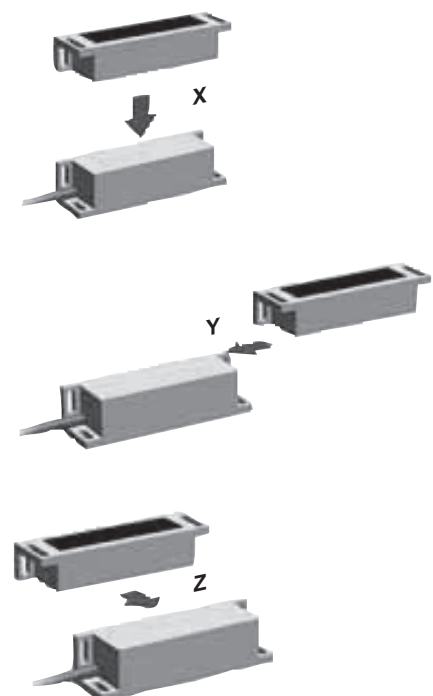
- Manual pulse reset input (AR version)
- Invisible screws with screw cover
- "Door open" diagnostic output
- LED diagnostics: orange = transmitter detected, operational product
- Controls the opening of doors and mobile protectors of dangerous machines
- Quick connection by M12 cord (FKT)
- Economical installation for double door with dual transmitter: X5-AR / SR-D
- Economical mounting for single-wing door with single transmitter: X5-AR / SR-S
- Direct control of dangerous movement

Aluminium profil 25x25
Aluminium profil 30x30
Aluminium profil 35x35



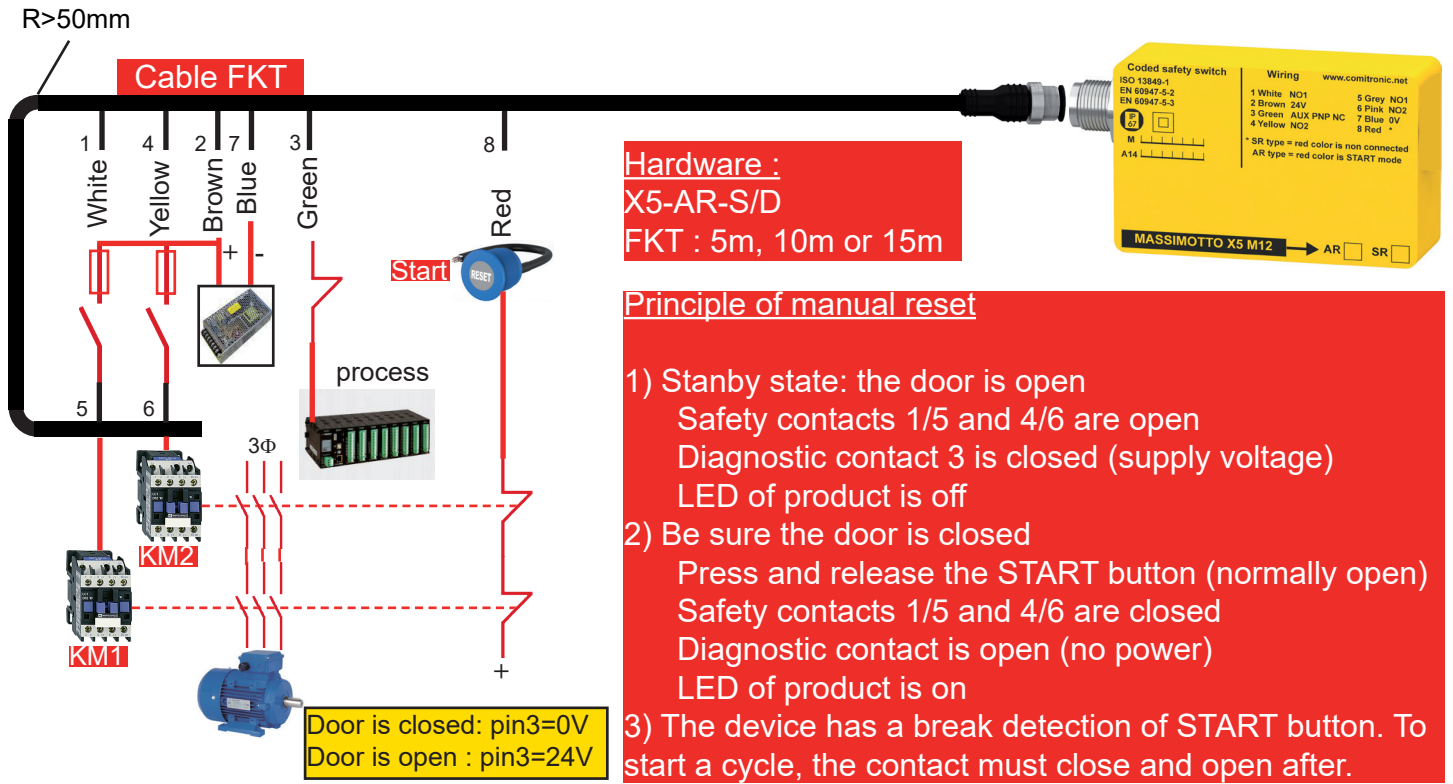
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Operating current	50 mA (DC) / 115 mA (AC): maximum values
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Classification	M3D25AU2
Weight	Transmitter: 66 g and Receiver: 150 g

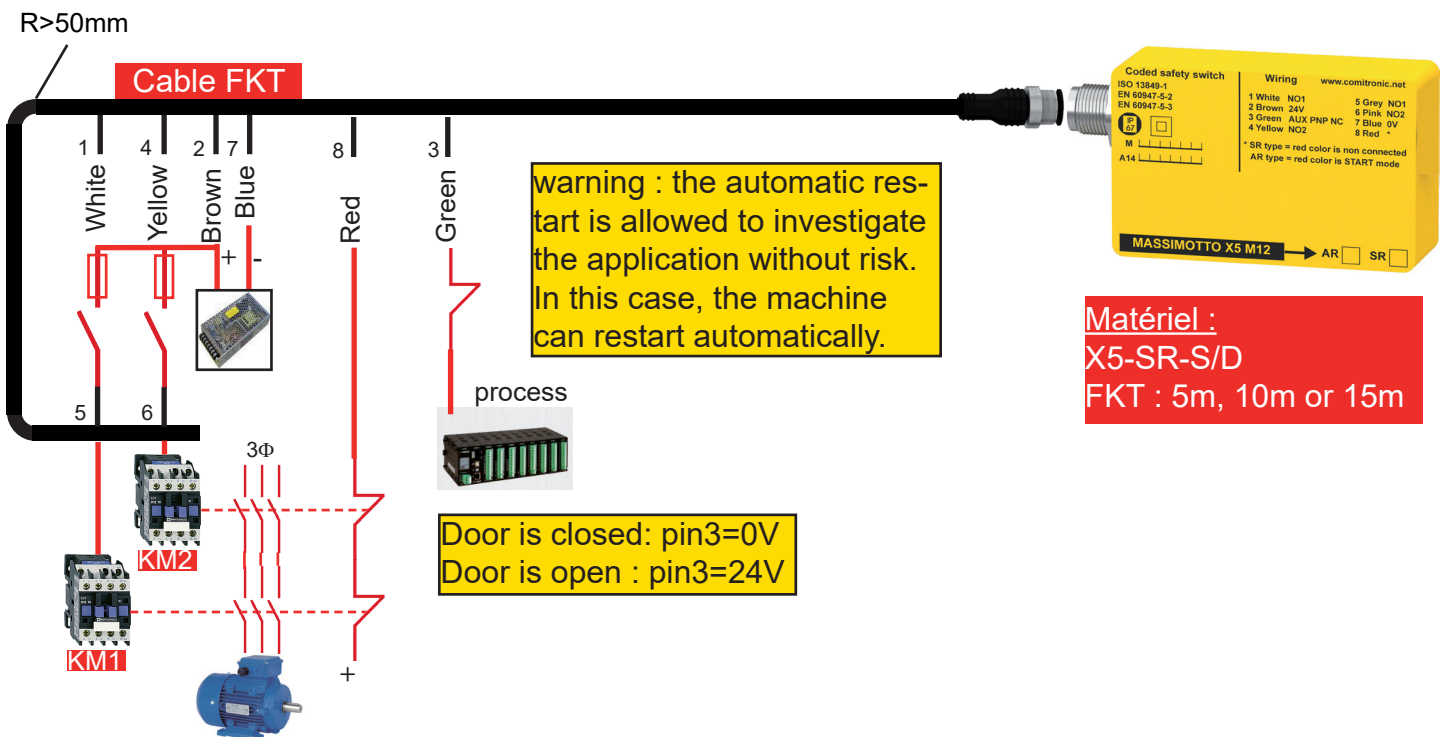


Non-contact safety sensor, without polarity MASSIMOTTO-X5

3. Principle of a PLd / SIL2 installation with manual reset : X5-AR



4. Principle of a PLd / SIL2 installation with automatic reset : X5-SR

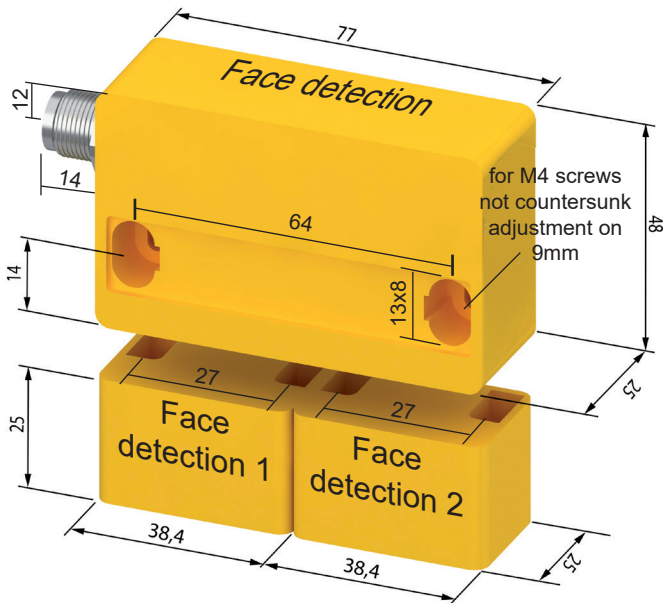


Mounting instruction MASSIMOTTO-X5 MASSIMOTTO-X5.2

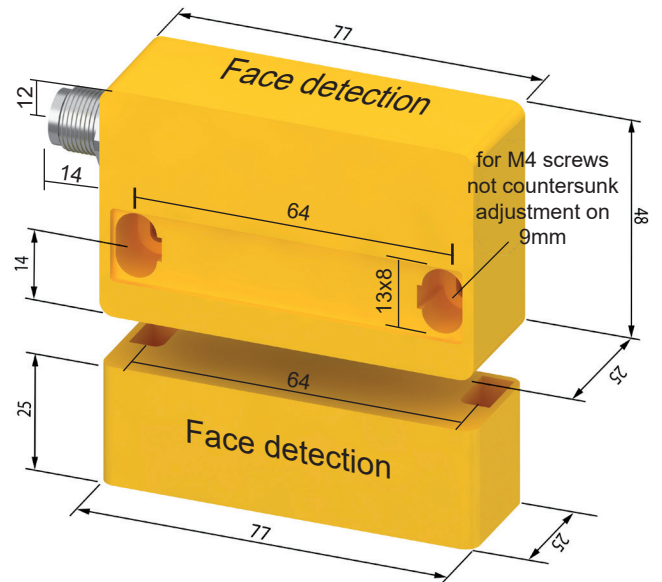
5. Mounting instruction : see chapter 9

- Drill the holes of the mounting bracket at $F = 4.5$ mm, with a spacing of 64 mm
- Preferably use our BH4 stainless steel screws (optional) for fastening
- Insert 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 must never be used as a mechanical stop
- Our product can be concealed behind a wall (stainless steel, aluminum) of maximum 4 mm thickness
- The radius of curvature of the cable shall be greater than 50 mm
- Insert the screw cover
- Connect the M12 cord (s)
- Test assembly. Do a full test once a year and record the results.

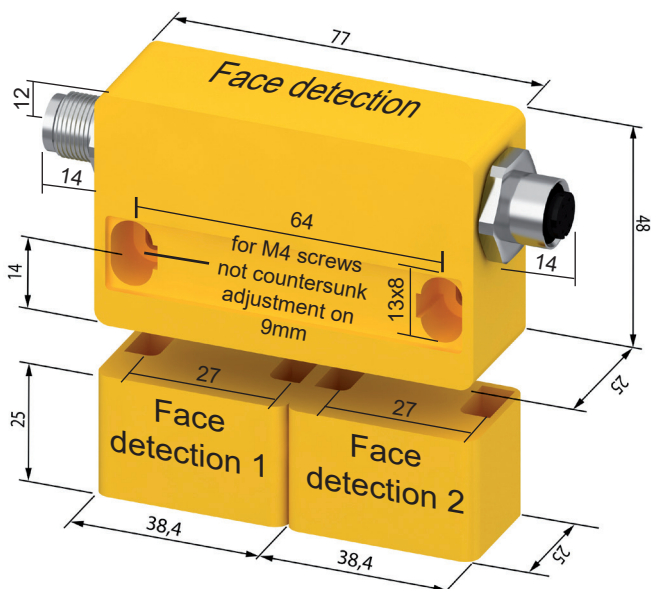
6. Dimensions "X5-D" and "X5-485-D"



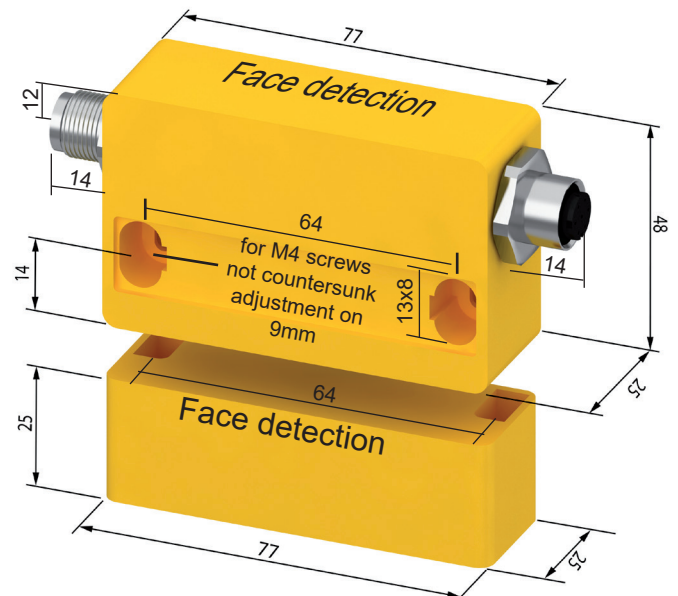
7. Dimensions "X5-S" and "X5-485-S"



8. Dimensions "X5.2-D"



Dimensions "X5.2-S"



Proof test MASSIMOTTO-X5 MASSIMOTTO-X5.2

9. Recommendations

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

The device must be installed in such a way that it prevents the penetration of body parts such as fingers and hands.

The product must be installed in such a way that it can not be dismantled by normal tools. For this we can provide OBH4 tamper proof screws. The product can be concealed behind an aluminum or stainless steel wall up to 3mm thick (3mm on the transmitter side and 3mm on the receiver side).

10. Periodic inspection

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

Example of an assembly on a door :

- Move the transmitter at 12 mm
- Observe that led goes out
- Check that contacts 1-6 and 2-7 are open
- X5 : Check that contact 3 is closed
- X5.2 : Check that contact 3-8 is closed
- Approach the transmitter to 8 mm
- Observe that led lights up
- Check that contacts 1-6 and 2-7 are closed
- X5 : Check that contact 3 is open
- X5.2 : Check that contact 3-8 is open
- Save the results in a form

11. Behavior of the product in case of failure

	Note	SR	AR	Contact 1-5	Contact 4-6	Contact 3	LED
		Entrée 8	Entrée 8				
Transmitter active	Closed door	Closed	pulse 0-24V-0	Closed	Closed	open	Light
Transmitter inactive	Open door	X	X	open	open	Closed	Off
Contact 1-5 stays close	Product defect	X	X	Closed	open	Closed	Off
Contact 4-6 stay closes	Product defect	X	X	open	Closed	Closed	Off
Entrée 8 stays open	Before start	0	0	open	open	Closed	Off

Note: When the product is in internal fault, it is imperative to replace it immediately.

MASSIMOTTO-X5 serie DECLARATION OF CONFORMITY



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33610 Canéjan
phone : +33 564 100 452
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EU DECLARATION OF CONFORMITY

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

SAFETY SWITCHES

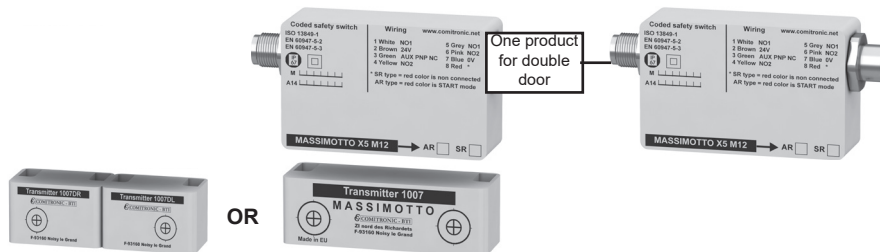
We hereby certify that the hereafter described safety components both in its basic design and construction conforms to the applicable European Directives.

Range	Classification IEC 60947-5-2	Safety Standards	Information	B10d	PFh	PFd
X5-AR-S/D	M3D2548AU2	EN 62061 ISO 13849-1 IEC 60947-5-3 IEC 60204-1 ISO 14119	SIL 2 PL d PDDB PELV/SELV TYPE 4 low level	2 000 000	1,42 E-08	1,24 E-03
X5-SR-S/D						
X5.2-AR-S/D						
X5.2-SR-S/D						

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

Note : All standards cover transmitter and receiver

Description :
Coded safety switch with process Acotom₃® for detects the position of the doors. It can 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, 29 june 2017

Authorised signature
Michel Conte
Director





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