

AMX4 & AMX5

AVAILABLE IN 24V OR 12V

Date of update : 26/10/2023 - Translated version



THE 12V VERSION IS NO LONGER PRODUCED SINCE
SEPTEMBER 1, 2023
THANKS FOR YOUR UNDERSTANDING
THE COMITRONIC-BTI TEAM

1. Field of application

AMX4 and AMX5 are electronically coded and autonomous sensors using our ACOTOM3 ® process to detect the opening of movable guards of dangerous machines. It detects its own failure and locks, preventing the safety line from closing. The sensor is SIL2 PLd certified by TÜV in accordance with EN ISO 14119, EN ISO 13849, EN IEC 62061. A sensor consists of two transmitter and receiver elements in PA6 or stainless steel 316L (AMX5OX). The receiver provides two potential-free NO safety lines and an auxiliary contact NC PNP (AMX5 or AMX5OX). This safety product must be checked at least once a year.

2. Fasteners and wiring

Equipped with two double brackets, the two elements are simply fixed simply by using tamperproof M4 screws (stainless steel washers supplied). The products must be well installed, a tool cannot disassemble the receiver or transmitter. Stainless steel tamper-proof screws are optional (BH4). The receiver is equipped with a PUR (or silicone for stainless steel version) multiconductor cable of diameter 5,5mm and standard length 3, 6 or 12m (other lengths on request), the minimum bending radius is 50mm. The sensor cable must be mounted in such a way that it is protected against external damage, e.g. by using mechanical shielding. After wiring the sensor, check that the safety line (Red-Black or Orange-Grey) is not short-circuited.

WARNING : This product must not be used as a stop between transmitter and receiver because of the dry contacts limited to **10G** in the receiver. For use **up to 30G**, use ANATOM or EPINUS series, etc...

3. Operation (24V)

Power supply: 24 VDC. If the two targets of the transmitter and receiver are opposite each other and the code is recognized, the NO lines (OSSD compatible) close and the auxiliary line opens (AMX5 or AMX5OX). The LED lights up. If the code is not recognized, if the alignment is not carried out or if the sensor detects the failure of one of its safety contacts, the functional line opens. Make sure that the sensor and the receiver have no mechanical contact when the door is closed. Keep a distance of at least 1mm between the two elements. Detection is carried out up to a distance of 10mm. If there is material between the transmitter and receiver, a test should be carried out to determine the detection distance. With the power off, the auxiliary line of AMX5 is open (white). The box must be installed in an area where it is not possible to enter body parts such as fingers or hands through the door into a hazardous area.

3.1 Operation (12V)

Power supply: 12 VDC. If the two targets of the transmitter and receiver are opposite each other and the code is recognized, the NO lines (OSSD compatible) close and the auxiliary line opens (AMX5-12V or AMX5-12V-OX). The yellow LED lights up. If the code is not recognized, if the alignment is not performed or if the sensor detects the failure of one of its safety contacts, the functional line opens. Make sure that the sensor and the receiver have no mechanical contact when the door is closed. Keep a distance of at least 1mm between the two elements. Detection is carried out up to a distance of 10mm. If there is material between the transmitter and receiver, a test should be carried out to determine the detection distance. With the power off, the auxiliary line of AMX5-12V is open (white). The box must be installed in an area where it is not possible to enter body parts such as fingers or hands through the door into a hazardous area.

4.1 UL508 Compliance Information

Wiring	Only copper 60/75°C
Thread size	24AWG
Clamping force	0,68Nm
Cupboard type 1 70°C ambient	4A UL Power Supply maxi listed 24V class 2 or UL fused transformer

4.2 Cable Output Compliance

Cable output in accordance with EN IEC 60947-5-2.

5. Technical data (24V)

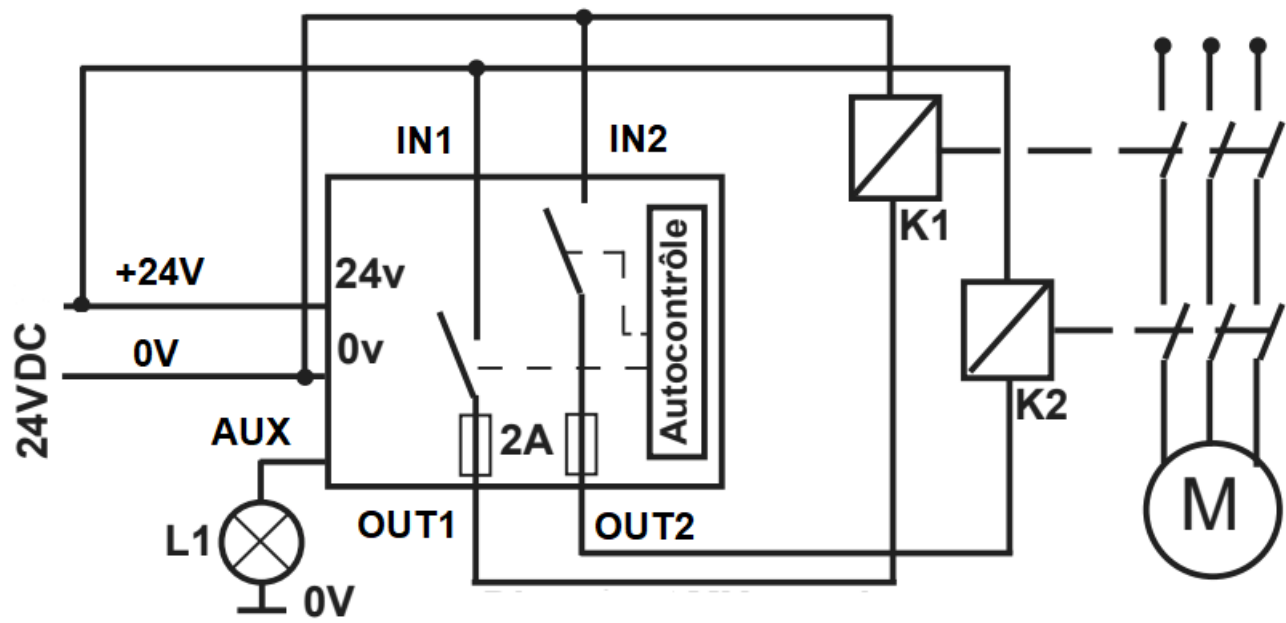
Power supply PELV/SELV IEC 60204-1	24 VDC -15% / +10% 24 VAC -15% / +10% 50/60Hz
Current of use	50 mA
Protection class	Protection II, Pollution 3
Ambient temperature	-25 °C / +60 °C
Protection class	PA6 : IP 68 / 316L : IP 69K
Vibration resistance	10~55 Hz, 1.5 mm double amplitude
Impact resistance	10 g
Switching frequency	< 2 Hz
Response time	< 400 ms (Ton)
Duration of risk	< 15 ms (Toff)
Safety line	AC1-AC15-DC13 : 50VAC 2A / 30VDC 2A pilot duty & general use (5 VDC/10 mA mini)
Auxiliary output	NF : 24 V / 250 mA general use
Output diagnostics Protection system	Protection by internal fuse Protection by internal fuse
Detection range transmitter/receiver (IEC 60947-5-3) Classification	Sn=12 mm (typical distance) Sao=10 mm (activation distance assured) Sar=15 mm (guaranteed breaking distance) Hysteresis 2 mm, Repeatability < 5%. M3C25AU1
Weight PA6 Weight SS316L	3m:335 g, 6m:515 g, 12m:810 g 3m:605 g, 6m:770 g, 12m:1075 g

5.1. Technical data (12V)

Power supply PELV/SELV IEC 60204-1	12 VDC -15% / +10%
Current of use	90 mA
Protection class	Protection II, Pollution 3
Ambient temperature	-25 °C / +60 °C
Protection class	PA6 : IP 68 / 316L : IP 69K
Vibration resistance	10~55 Hz, 1.5 mm double amplitude
Impact resistance	10 g
Switching frequency	< 2 Hz
Response time	< 400 ms (Ton)
Duration of risk	< 15 ms (Toff)
Safety line	AC1-AC15-DC13 : 50 VAC/DC / 2 A pilot duty & general use (5 VDC/10 mA mini)
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6. Diagram



AUX: only for AMX5 product

***i** Safety outputs can be daisy-chained for up to 30 sensors (degrades performance index)*

Cable version

Color	Function
Brown	+24V
Blue	0V
Red	IN1
Black	OUT1
Orange	IN2
Grey	OUT2
White	AUX ¹

AUX¹: only for AMX5 product

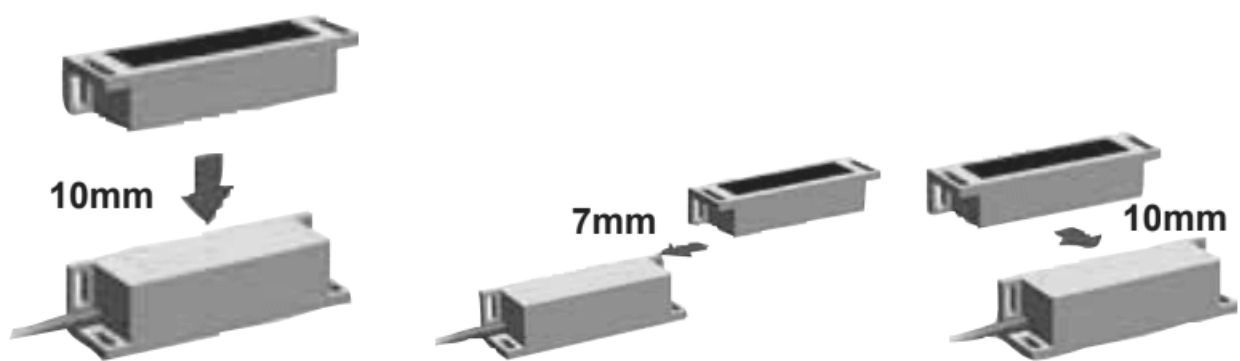
AMX5 MKT version with M12 connector :

M12 pin number	Function	Color	
1	OUT1	White	
2	OUT2	Brown	
3	AUX	Green	
4	+24V	Yellow	
5	0V	Grey	
6	IN1	Pink	
7	IN2	Blue	
8	NC ²	Red	

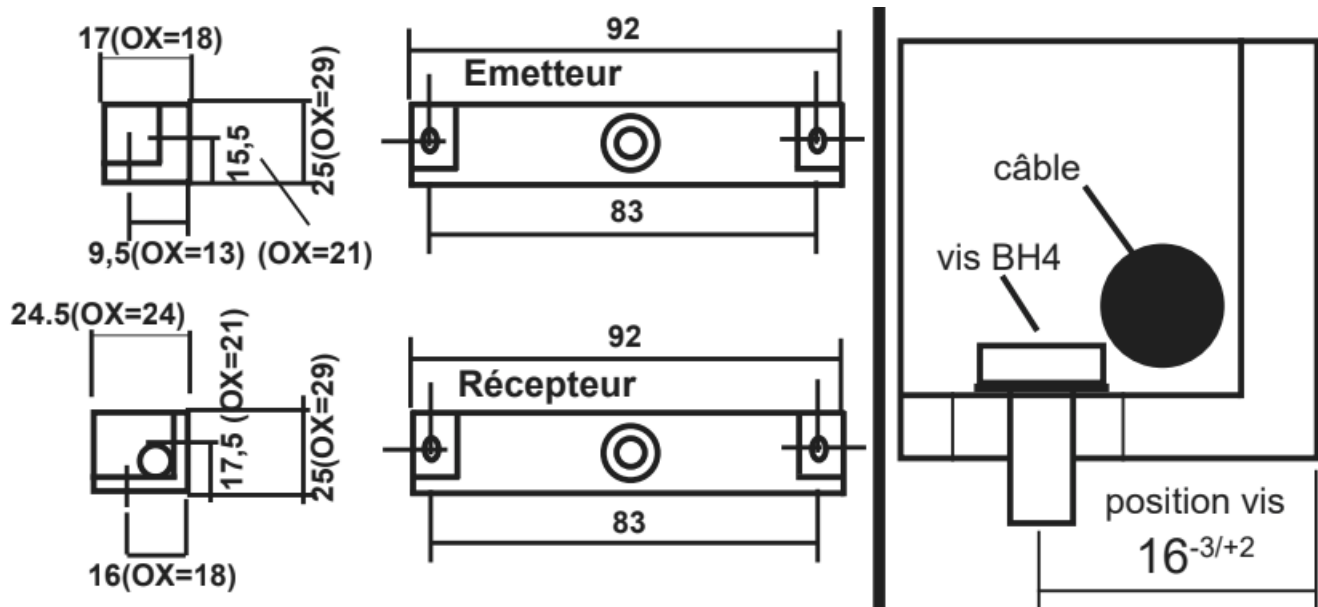
NC²: pin not connected

Apply our dielectric grease to the M12 connector when using in damp environments and/or at high and low temperatures.

7. Activation distance



8. Dimension



9. T-SPLITER M12.8 compatibility



General information

This product allows to auto-connect the safety sensors by reducing the wiring to the strict minimum. Only one cable connects the electrical cabinet to the sensors. The connection of the contacts, the power supply and the grouping of auxiliary outputs are carried out automatically. It is possible to connect several M12.8 T-SPLITERS cascade directly or via an FMKT cord (optional). The FKT cord for connection to the electrical cabinet is also optional.

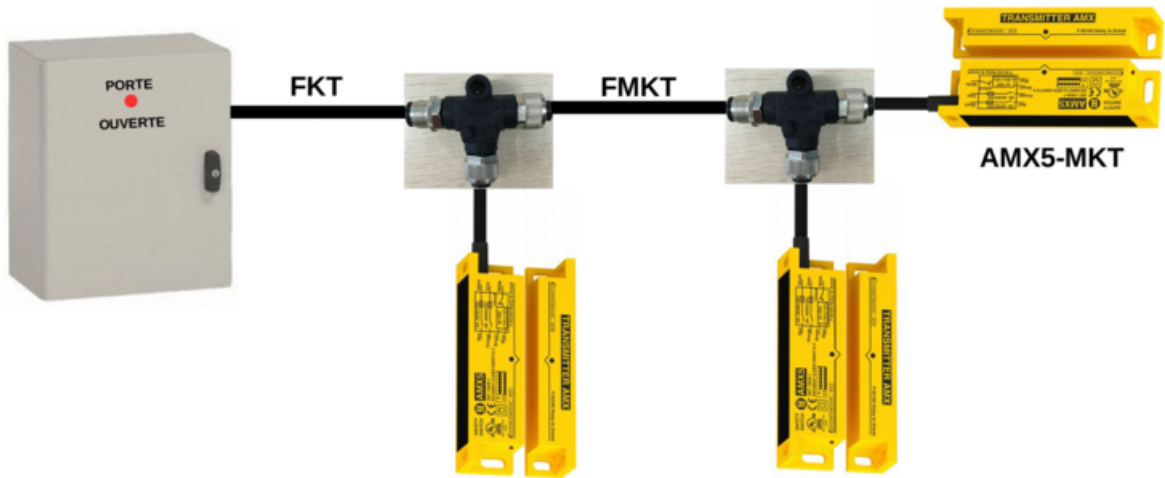
Main features

Maximum voltage between two wires	30 VDC
Maximum current per wire	2A
Connecting	2 X M12 / 8p females and 1 X M12 / 8p males
Fixation	1 screw M4
Operating temperature	-20°C to +80°C
Clutter	57mm * 44mm * 20mm
Overall weight	26g

Example of mounting three sensors in series without intermediate cord

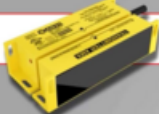


Example of mounting three sensors in series with intermediate cord



10. ACOTOM® process

The ACOTOM® process created by BTI in 1993 is based on a dual independent electronic decoding system with magnetic field multiplication. Our system is based on components approved in the automotive industry, telephone industry, etc... It does not include a reed bulb system, the disadvantages of which are well known, or a transponder system, which can have certain disadvantages in the industrial environment.



PROCESS ACOTOM®

EXCLUSIVITÉ TECHNOLOGIQUE

3 ANS
GARANTIE

2 DOUBLES CHAMPS MAGNÉTIQUES
INDÉPENDANTS CODÉS INVOLABLES

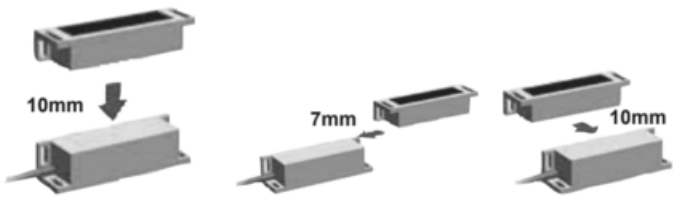
DOUBLE CODAGE ÉLECTRONIQUE AVEC
AUTOCHÔTÔLE

LED DE VISUALISATION
PAR TRANSPARENCE

BOÎTIER EN PA6 OU
INOX 316L

- Other benefits :
- 2 tamper-proof double coded magnetic fields.
 - Shock resistance greater than 10g.

- Double mounting bracket.
- Static contacts with unlimited operating cycle.
- Operates through 6mm stainless steel.
- Very high immunity to external electromagnetic disturbances, both conducted and radiated.
- Can be operated in any direction, even at low speed, for sliding or tilting guards, etc.



Revolutionary safety switch :

- contactless (easy installation)
- anti-fraud
- level 1 coding according to EN ISO 14119
- electronic
- Hall effect detection
- High detection distance

ACOTOM® 1 SSR Range AUTONOMUS thanks to: Floating contacts Relays Outputs 2A/250V -2 million electrical cycles at full load PI=c (up to PI=e with AWAX)	ACOTOM® 2 ANATOM Range with AWAX safety relay 100% electronic solid-state contacts=> unlimited number of cycles Up to 30 switches in series connection on an AWAX safety relay Warning Risk analysis up to PL=e with AWAX	ACOTOM® 3 AMX Range AUTONOMUS thanks to: Floating contacts Relays Outputs 2A/48V -2 Million electrical cycles at full load 10 million mechanical cycles TÜV certified: PI= d SIL2 CAT.3 thanks to: integrated self-test (up to PI=e with AWAX)

ACOTOM® vs Reed

Reed switch:

This component is classified as a mechanical switch, but great care must be taken with the In parameter (rated contact current). Reed bulbs are fragile and sensitive components and their B10d is given at 20% of In in accordance with ISO 13849-1. In general In=10mA so the B10d is given for Id=2mA. In the best cases we find products with In=100mA and therefore a B10d given for Id=20mA. The problem is that most safety boxes or even simple relays require a current greater than 20mA. In addition, we include the Ci tampering criterion, since fraud is taken into account in security applications. Because of their operating principle, these components have a Ci rating of medium.

These components are sensitive to magnetic and electromagnetic interference, and are subject to switching hazards, especially when working on sliding doors. The difference in ON/OFF switching distance, known as hysteresis, is significant, which limits the width of the doors to prevent fingers, for example, from passing through (max. 14mm). These products require an external mismatch controller.

It is therefore indelicate to present these products knowing that their B10d does not correspond to typical use. The best approach would be to ask for the B10d for current use, but this will be very difficult.

ACOTOM® process safety sensor

Reed switches are replaced by ACOTOM® process sensors.

These components can be fitted to any type of door or machine guard, with any type of movement.

They solve all the problems of the reed switch:

- Autonomous
- High Ci
- High breaking capacity
- Low hysteresis
- High safety category

Comparative

Product	Ip (A)	In (A) current for respective B10d	B10d (cycles)	MTTFd (year)	Infrared (Ci)	LED diagnostics and auxiliary output	Safety category without controller
Reed	0.1	0.02	1000000	192.9	Low	Limited to 6 in serial connection. Does not indicate the actual status of the decoding system.	None
Mechanical	3	0.6	20000	3.9	Low	Without LED	Cat. 1
ANATOM78S	0.8	0.4	Without	334	High	Limited to 30 in serial connection. Indicates the actual status of the decoding system for each sensor alone or in series.	None
AMX	8	2	2000000	385.8	High	Limited to 100 in serial connection. Indicates the actual status of the decoding system for each sensor alone or in series.	Cat. 3

B10d: Average number of cycles before a dangerous failure of up to 10% of the components.

nop: Average number of actuations per year. In the example above nop = 51840

MTTFd: Mean time in years before a dangerous failure occurs

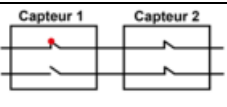
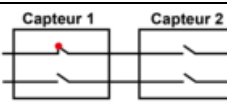
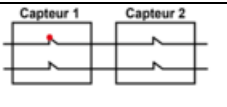
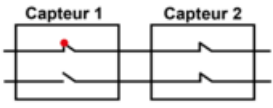
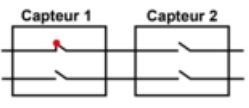
TM: 20 years (maximum service life in accordance with EN ISO 13849-1)

Ip: Breaking capacity of a contact

In : Rated switching current for the B10d

	MAGNETIC REED SWITCH	ACOTOM®
Coding	Low level (can be activated by a simple magnet or horseshoe)	High level of infraudability. Level 1 low according to EN ISO 14119. (2 complex and independent anti-sabotage magnetic fields)
Concealed mounting or flush mounting	Not possible (sensitive to the presence of metal)	Possible (detection through 6 mm stainless steel or aluminium)

Installation and misalignment	Unreliable solution for sliding doors (long desynchronisation between the two reed contacts)	Easy installation also suitable for sliding and slow-closing doors Lateral misalignment tolerance (7mm)
Traceability of decoding	LED on the same line as the auxiliary line=> loss of power, therefore loss of auxiliary line when several switches are connected in series	Reliable LED information even when several switches are connected in series (the LED is independent of the auxiliary line)
Mechanical damage to contacts	Not significant B10d is given at 20% of the inrush current i.e. approximately 40mA (20% of 200mA) => not enough to act directly on the contactor => a safety relay is required	Acotom2: 100% electronic => No influence of the number of openings and closings => Unlimited number of cycles Acotom3 : B10d: 2 million electrical cycles at full load (2A) => can act directly on contactors 10 million mechanical cycles

Reed switch diagram		➡		➡	
Safety sensor with reed bulb, emergency stop, limit switch...	A sensor opens but a contact remains stuck.	😊	Opening of 2nd sensor.	😞	1st sensor closed then 2nd sensor closed.
Self-control box	The line opens and the fault is stored.	😊	Opening of 2nd sensor, loss of previous fault memory.	😞	Line closed. THE SYSTEM IS FAULTY BUT HAS NOT BEEN SEEN.
ACOTOM3® process		➡		➡	