

INSTRUCTION MANUAL SM1 AND SM2 SERIES ELECTROMAGNETIC INTERLOCKING FOR HOLDING CLOSED POSITION OF GUARDS AND DOORS OF DANGEROUS MACHINES



OTHER PRODUCTIONS: FORCE 0 AND IP69K TOUCH BUTTON



COMITRONIC-BTI THE LEADER IN STAND-ALONE SAFETY SWITCHES



SM1 AND SM2 SERIES

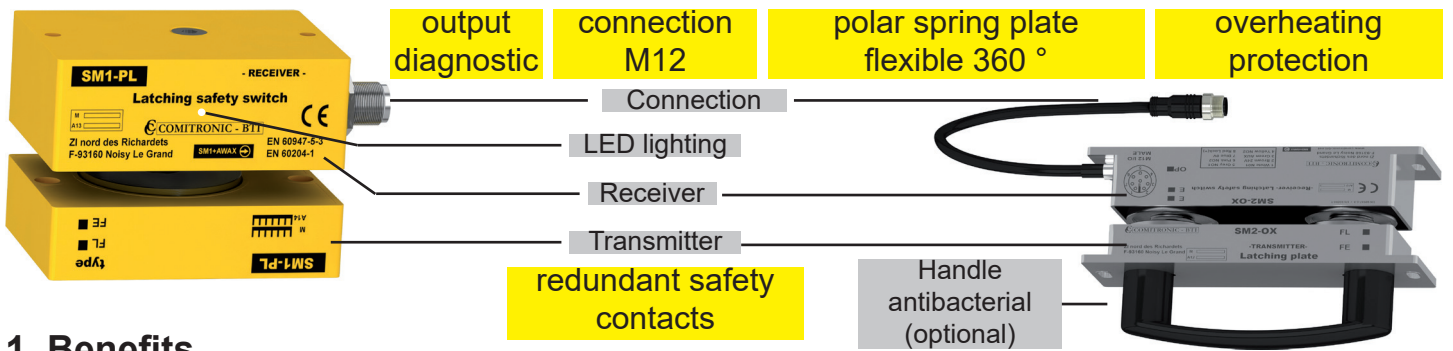
Hold and interlock

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SM1 AND SM2 SERIES

Hold and interlock



1. Benefits

SM1 Series

- Electromagnetic holding of doors/casings of dangerous machines
- ACOTOM magnetic field coding closure detection[®]
- Version E: sticking with power off [security access control]
- Version R: sticking with power on [fire door, public access]
- EOP version: sticking with power off acc. ISO 14119 [safety machine]
- ROP version: sticking with power on and compatible with ISO 14119 [safety machine]
- OX version: stainless steel 316L body and stainless steel suction cup : force up to 50 kg
- PL version: PA6 body, steel suction cup: force up to 30 kg, stainless steel suction cup: force up to 50 kg
- Automatic compatible lock/unlock command
- Two safety contacts
- An auxiliary output that indicates an open door or a default
- LED which indicates the closing of the door and that the decoding of the transmitter is complete
- Overheating protection with self-resetting device
- Optional RFID pairing version: contact us for information

SM2 Series

- Electromagnetic holding of doors/casings of dangerous machines
- Version E: sticking with power off [access]
- Version R: sticking with power on [fire]
- EOP version: sticking with power off and compatible with ISO 14119 [machine]
- ROP version: sticking with power on and compatible with ISO 14119 [machine]
- Stainless steel 316L body and stainless steel suction cup: force up to 100 kg
- ACOTOM[®] tamper-proof closure detection via coding
- Automatic compatible lock/unlock command
- Two safety contacts
- An auxiliary output that indicates an open door or a default
- Overheating protection with self-resetting device
- Optional antibacterial door handle (EPB)

2. Cautions for Use

The polar plate of the transmitter and the suction cup of the receiver must be kept clean and must not be damaged. For the version "sticking in off", the maximum duration of power is 10 min, we advise placing a control button near the door to limit the duration. The B22-CV-10L-RGO-D3T10-BU-MKT touch button performs the "open" function and limits the duration to 10 min:

- 1st support = delayed opening at 10 min
- 2nd support = closing (even if the duration has not elapsed)

SM1 AND SM2 SERIES

Hold and interlock

3. Principle

3.1 keeping the doors in the closed position (machine) or in the open position (fire)

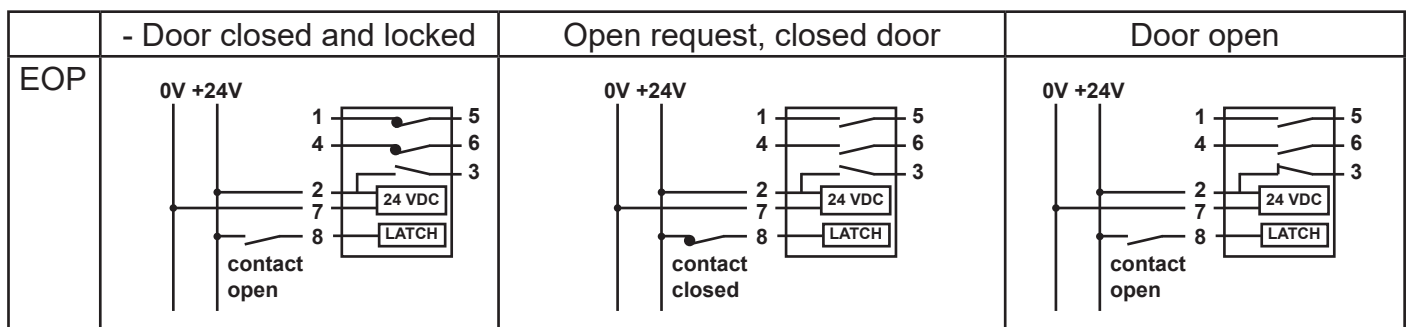
The electromagnetic lock acts as a safety sensor with a controllable hold using an electric control. We have the advantage of offering both types of interlock, in off or on position. This product is used in cases where the door can be subjected to shocks and vibrations to prevent it from triggering the safety. Versions are adapted to interlocking.

3.2 Interlocking

For safety interlocking applications, we offer "OP" versions that add compliance with ISO 14119. In this case, the use of the sticking with off power version is recommended. The holding force makes it possible to protect the operator during the stopping phase of an inertial movement whose duration is less than two seconds. The guaranteed force is called FZh.

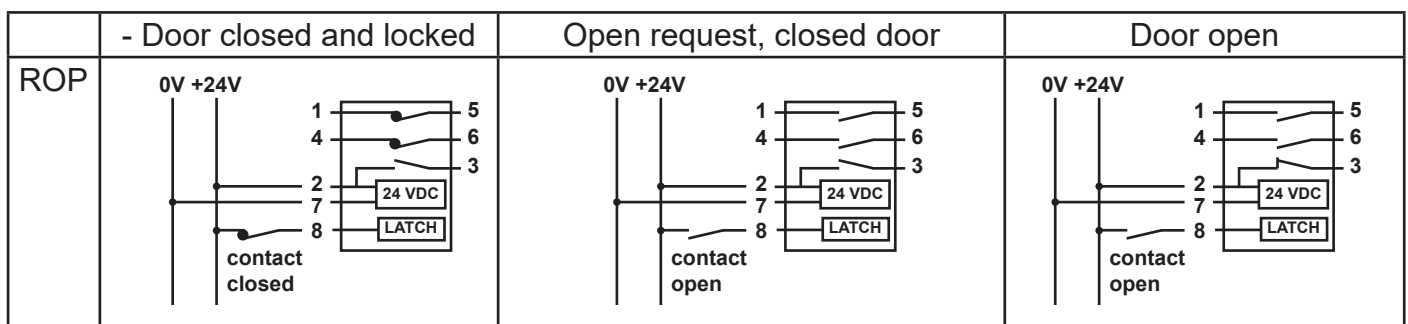
4. Operation of OP versions

4.1 EOP version: interlocking with power off



- Upon opening request (pin 8 powered), the safety contacts open
- The diagnostic contact (pin 3) reproduces the status of the door: sends the voltage if the door opens, regardless of the opening command
- The EOP version is recommended for machine safety because it preserves safety in case of power failure

4.2 ROP version: interlocking with power on



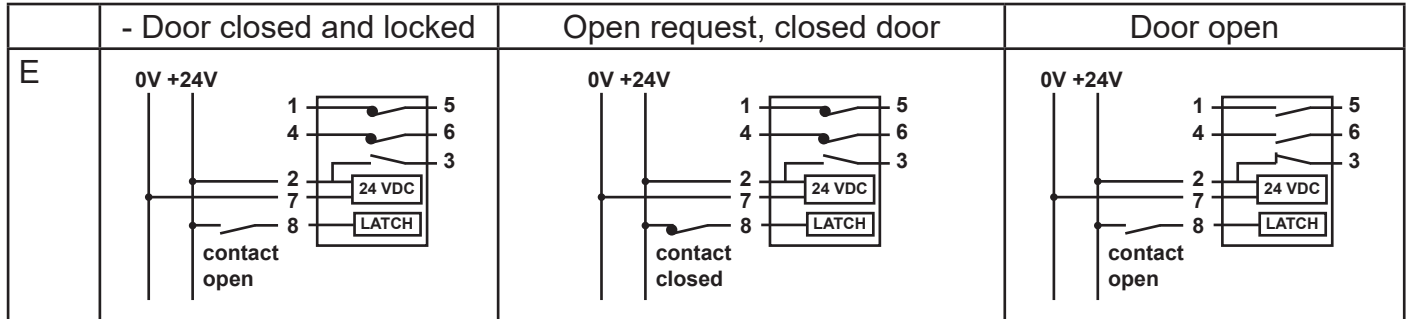
- Upon opening request (pin 8 deactivated), the safety contacts open
- The diagnostic contact (pin 3) reproduces the status of the door: sends the voltage if the door opens, regardless of the opening command
- The ROP version can be used for machine safety according to the risk analysis

SM1 AND SM2 SERIES

Hold and interlock

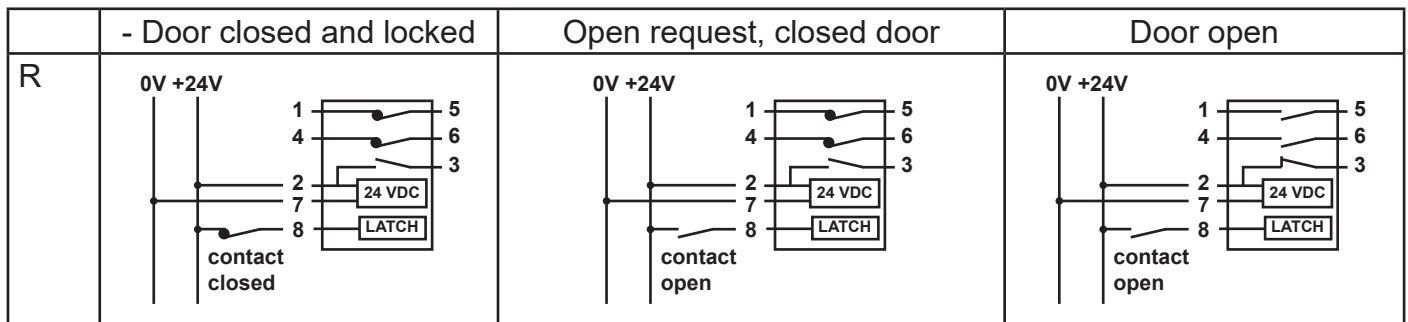
5. Operation of versions E and R

5.1 E version: holding the power off



- The request for opening/unsticking (pin 8 powered) releases the suction cup. Opening the door switches the two contacts from closed to open, and the diagnostic switch changes from open to closed
- Contacts are positioned independently of the hold command

5.2 R version: holding with power on



- The request for opening/unsticking (pin 8 deactivated) releases the suction cup. Opening the door switches the two contacts from closed to open, and the diagnostic switch changes from open to closed
- Contacts are positioned independently of the hold command

6. Summary of applications by model

Model	Process	Machine safety	Recommended for machine safety	ISO 14119
E	X			
R	X			
EOP		X	X	
ROP		X		

Comitronic-Bti suction cups offer a wide range of choices to the customer. The steel versions are very competitive while the stainless steel versions offer great performance of holding force in harsh environments.

SM1 AND SM2 SERIES

Hold and interlock

7. Main Features

	SM1		SM2
	OX	PL-AC	OX
Supply voltage	21.6 VDC to 26.4 VDC		
Power supply without magnet action	40 mA to 24 VDC		
Power supply with magnet action			
Type E	670 mA	0.21 A	1.35 A
Type R	150 mA	0.075 A	0.3 A
Connection	8 x 0.25 mm ² Rmin > 50	M12 male 8 pin baseplate	8 x 0.25 mm ² Rmin > 50
LED lighting	Yes		No
Specifications of contacts	Safety: 2 x 40 V/300 mA, Diagnostics: 40 V/300 mA		
Operating temperature	-25°C to +50°C (-13° to +122° F)		
Detection distances			
Sn (typical distance)	5 mm		
Sao (ensured activation distance)	4 mm		
Sar (ensured rupture distance)	8 mm		
Offset	Centering and parallelism to be performed		
Holding force			
R	~ 500 N	~ 500 N	~ 936 N
E	~ 400 N	~ 300 N	~ 820 N
Water tightness	IP 69K box IP 67 connector	IP 54	IP 69K box IP 67 connector
Box/housing material	Stainless steel	PA6	Stainless steel
Cable or connector	316L PUR polyether	Cu/Ni baseplate	316L PUR polyether
Weight with packaging	1110 g	700 g	2000 g
Screw mounting	2 x M4	2 x M4	2 x M6

8. Assembly Instructions

8.1 SM1-PL and SM1-OX

- a) Drill the holes of the mounting bracket at $\Phi = 4.5$ mm, with a center distance of 72 mm.
- b) Use the stainless steel washers supplied with the product in order to preserve the box's casing
- c) With the door closed, the distance between the polar plate and the suction cup should ideally be 0. The polar plate is flexible which makes it possible to compensate for function
- d) The bending radius of the cable must be greater than 50 mm.
- e) Use tamper-proof screws

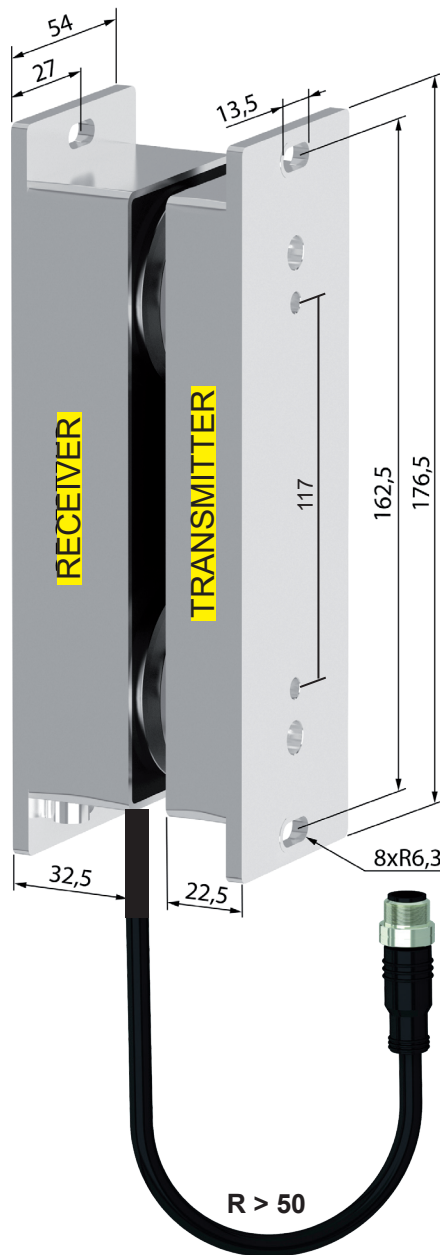
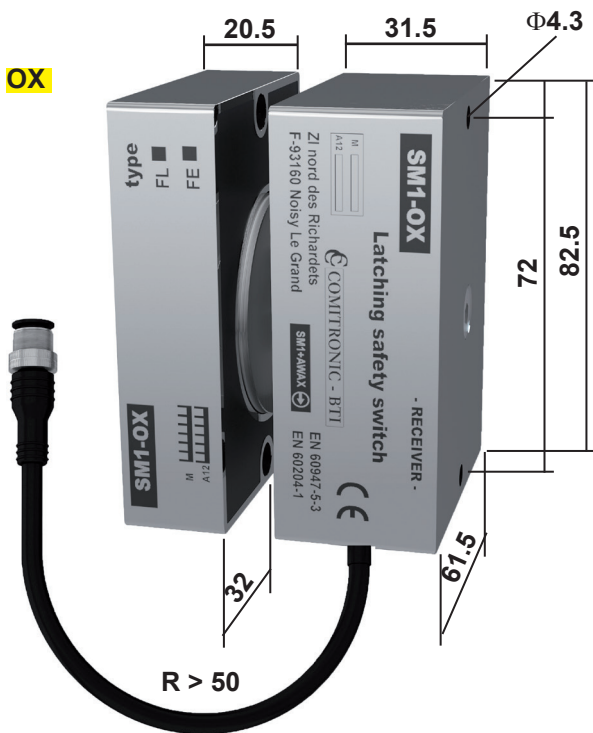
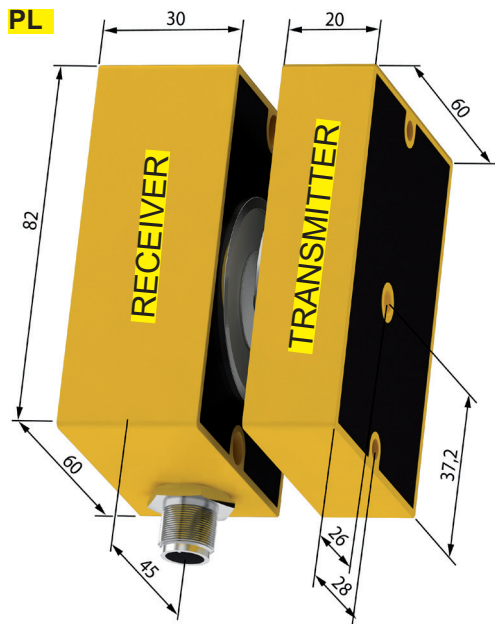
8.2 SM2

- a) Drill the holes of the mounting bracket at $\Phi = 6.5$ mm, with a center distance of 163 mm.
- b) c) d) e) Same as in §7.1
- f) The transmitter can be equipped with the EPB handle. The advantage is to ensure a pulling force in the axis of the suction cups and thus obtain the maximum force by avoiding the leverage effect.

SM1 AND SM2 SERIES

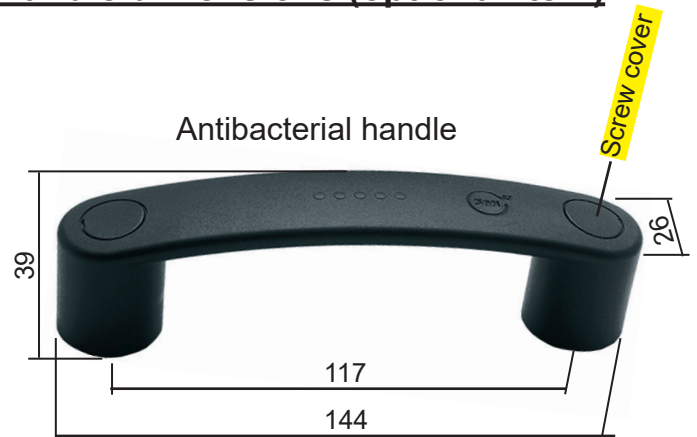
Hold and interlock

9. SM1 Model Dimensions 10. SM2 Model Dimensions



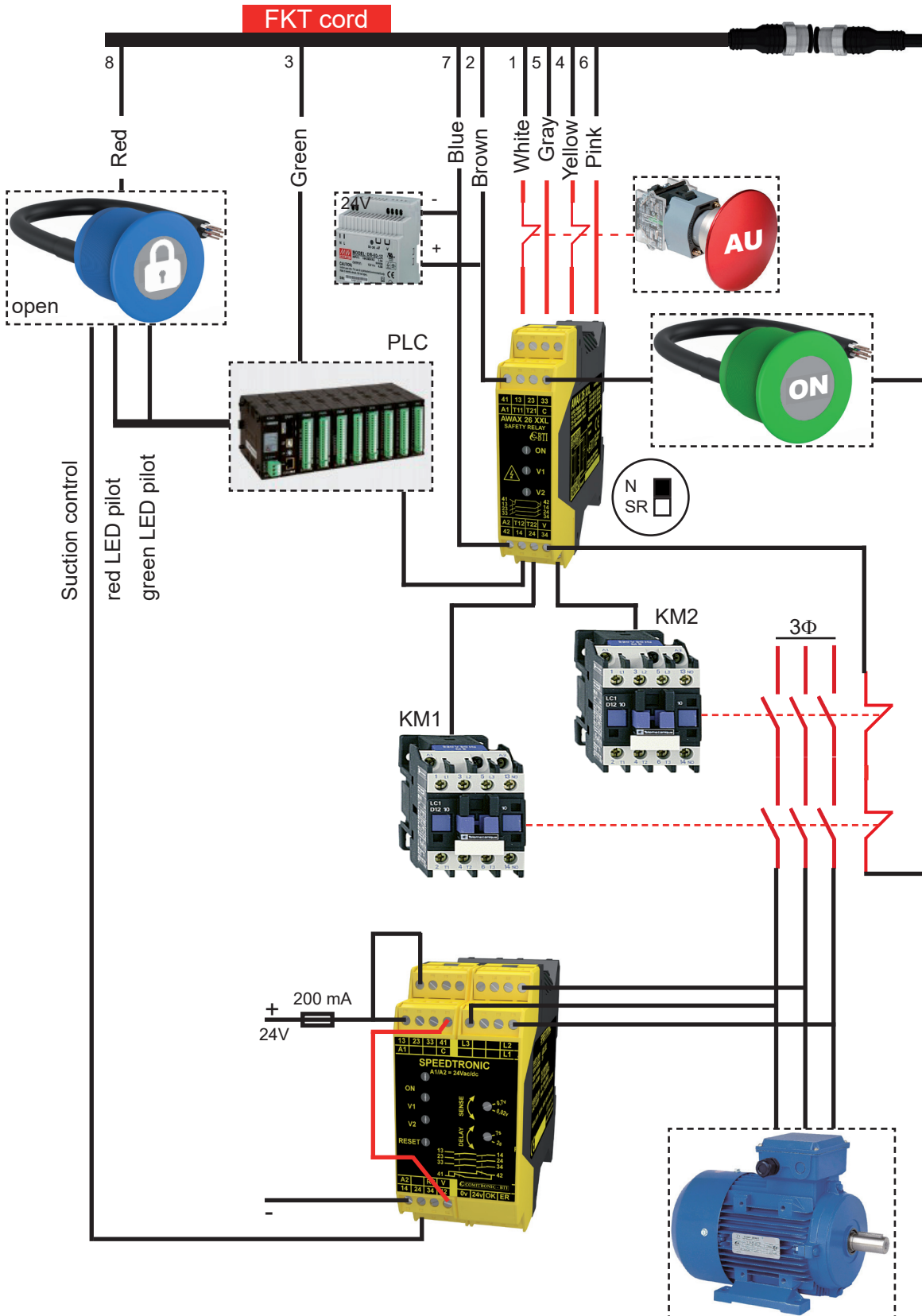
M8 for handle attachment
center distance 117 mm

11. EPB handle dimensions (optional item)



Complete solution of interlocking machine with inertia

Equipment for this installation:
 SM1-OX-EOP-OX-FL (interlocking)
 AWAX26XXL (monitoring, on/off management)
 B22-CV-1OL-RGO-D3T10-BU-MKT
 (opening command)
 SPEEDTRONIC (zero speed control)
 FKT: 5 m, 10 m or 15 m (connection)



SM1 AND SM2 SERIES

Hold and interlock

13. Recommendations

Protect the cable against external damage by using, for example, a mechanical shield (tube, mesh, etc.). Align the two parts correctly so that the polar plate is centered with the suction pad. The polar plate is equipped with a flexible system, it can be slightly compressed to guarantee a good contact.

14. 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:

Version E or R

- Remove magnetic hold (pin 8): E = +24V, R = aloft
- Move the transmitter 8 mm
- SM1: Observe that the LED turns off
- Check that contacts 1-5 and 4-6 are open
- Check that contact 3 is closed (supply voltage)
- Approach the transmitter at 4 mm
- SM1: Observe that the LED lights up
- Check that contacts 1-5 and 4-6 are closed
- Check that contact 3 is open (no voltage)
- Close door
- Reactivate the hold (pin 8): E = aloft, R = +24V

EOP or ROP version

- Remove magnetic hold (pin 8): E = +24V, R = aloft
- Move the transmitter 8 mm
- SM1: Observe that the LED turns off
- Check that contacts 1-5 and 4-6 are open
- Check that contact 3 is closed (supply voltage)
- Approach the transmitter at 4 mm
- SM1: Observe that the LED lights up
- Check that contacts 1-5 and 4-6 are open
- Check that contact 3 is open (no voltage)
- Close door
- Reactivate the hold (pin 8): E = aloft, R = +24V
- Check that contacts 1-5 and 4-6 are closed
- Check that contact 3 is open (no voltage)

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

ELECTROMECHANICAL SAFETY MODULES

Range	FZH ISO 14119	Safety Standards	Information	MTTFd
SM1- OX-E	300 N	ISO 13849-1	up to PL e	100
SM1-OX-R	440 N	IEC 60947-5-3	PDDDB+EMC	
SM1-AC-E	230 N	IEC 60204-1	PELV/SELV	
SM1-AC-R	380 N	ISO 14119	TYPE 4: low	
SM2-OX-E	630 N			
SM2-OX-R	720 N			

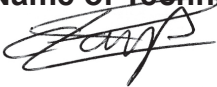
It is recommended to test the system at least once a month.

Serial number coding & example

YEAR WEEK NAME OPERATOR / NAME TEST MANAGER POSITION

11 36 AB CD 03

Name of Technical Authority: Christophe Pays of COMITRONIC-BTI



This product range is intended to monitor an emergency stop or safety sensor.

The safety modules are designed and manufactured according to UL508 / CSA C22.2 Regulation.

Safety modules must be used following diagram and directives described in our data sheet.

Place and date of issue: Noisy, 21 July 2017

Authorized signature:

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