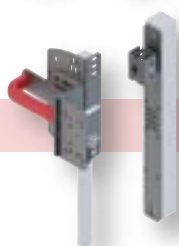


**Safety Limit Switches with separate actuator** page 2



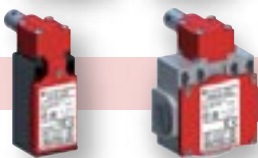
**Electromagnetic Safety Devices with separate actuator** page 10



**Safety Handles** page 24



**Safety Hinges** page 28



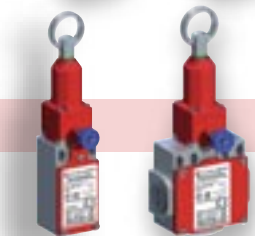
**Hinge mount Safety Limit Switches** page 34



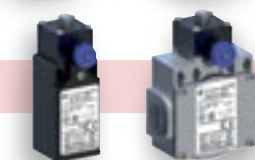
**Safety Magnetic Sensors** page 40



**Safety Modules** page 46

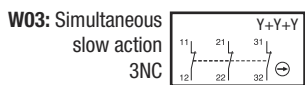
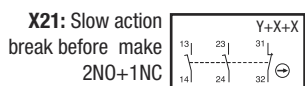
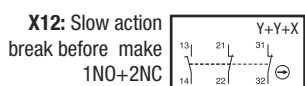
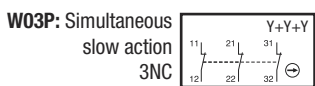
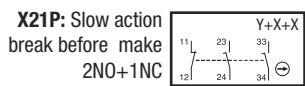
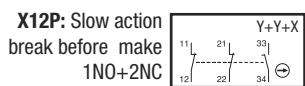
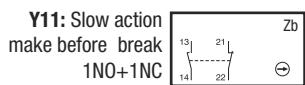
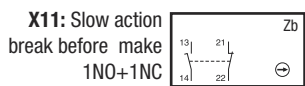
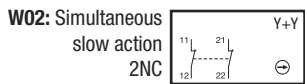
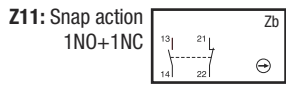


**Safety Limit Switches with rope** page 50

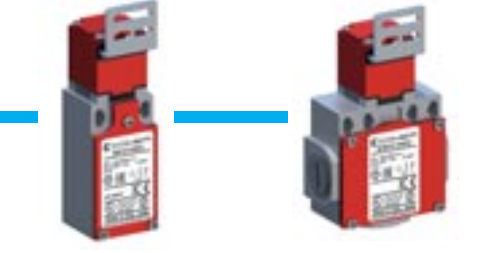


**Safety Limit Switches with reset** page 60

## Safety Limit Switches with separate actuator



**SP\_K series (Plastic)**      **SDP\_K series (Plastic)**



**SM\_K series (Metal)**      **SDM\_K series (Metal)**



**Adapter G Type**      **SFP\_K series (Plastic)**



**SBP\_K series (Plastic)**      **SBM\_K series (Aluminium)**      **SCM\_K series (Aluminium)**

**Contact blocks**  
**Type:** double break, electrically separated  
**Approvals:** UL 508 / CSA C22-2 n. 14

## Safety Limit Switches with separate actuator - Description

### Applications

Easy to use, the limit switches with small latch (key) offer specific qualities:

- Capability for strong current switching (conventional thermal current 10 A).
- Opening guaranteed of the "N.C." contact(s) when the small latch is withdrawn from the limit switch.
- Contact blocks with dependent action and positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖).
- Electrically separated contacts.
- Precision on operation positions (consistency).
- Immunity to electromagnetic disturbances.

These specific features make the limit switches ideal for monitoring and protection of industrial machines without inertia in which downtime is less than access time to the dangerous area. Use on sliding or pivoting protectors (covers, cases, doors, grids, etc.).

- They contribute to protection of operators working on dangerous machines, by opening the control circuit. Withdrawal of the small latch (key) by opening the mobile protector causes immediate stopping of the machine drive.
- They comply with the requirements of European Directives (Low Voltage and Machines Directive) and are conform to European and international standards.

### Description

Safety limit switches with small latch (key) of SP/SDP/SBP/SFP series are made of fibre-glass reinforced UL-V0 thermoplastic material, and they offer double insulation □ and a degree of protection IP65. Safety limit switches of SM/SDM series are made of zinc alloy (zamack) and have a degree of protection IP66. Safety limit switches SBM/SCM are realized in aluminium material and have a degree of protection IP66.

All models are equipped with 1NO+1NC, 2NC, 1NO+2NC, 2NO+1NC or 3NC contact blocks with positive opening operation of the "N.C." contact(s).

**Casing**

- SP/SM with standardized dimensions acc. to EN 50047
- SBP/SBM width with standardized dimensions acc. to EN 50041

**Mounting the casing**

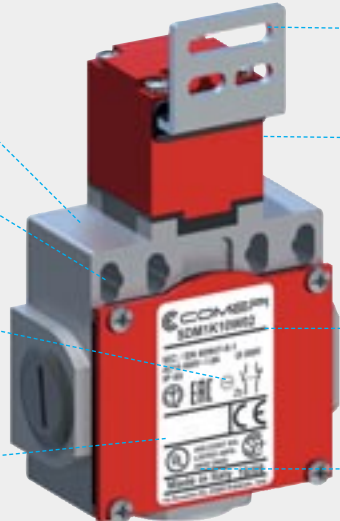
- 2 x M4 screws on top part for SP/SM series
- 2 or 4 x M4 screws on top part for SBP/SDM series
- 2 or 4 x M5 screws for SBP/SBM series
- 2 x M5 screws on top part for SFP/SCM series

**Contact Block:**

- Positive opening operation
- Snap action or slow action
- Contacts are electrically separated

**Connecting terminals:**

- Block of 2 contacts: M3.5 (+, -) pozidriv 2 screw
- Block of 3 contacts: M3 (+, -) screw
- Screw head with captive cable clamp
- Markings conform with IEC 60947-1, IEC 60947-5-1 standard



**A variety of operating inox keys:**

- Flat / Bent
- Shock absorbing
- Adjustable

**Operating head**

- Fully turnable head is available for SP/SDP/SM/SDM series

**Cover:**

- 1 screw for SP/SDP series
- 2 screws for SFP/SBM series
- 3 screws for SM series
- 4 screws for SDM/SCM series

**Electrical connection:**

- 1 x cable gland for SP/SM/SBP/SBM series
- 2 x cable gland for SDP series
- 3 x cable gland for SFP/SDM/SCM series

**Symbols**

**Example:**

SD	M	1	K	10	X	1	1
----	---	---	---	----	---	---	---

**Structure:**

			K				
--	--	--	---	--	--	--	--

**Casing width:**

**S** = 30 mm width + 1 cable inlet  
**SB** = 40 mm width + 1 cable inlet  
**SC** = 60 mm width + 3 cable inlets  
**SD** = 50 mm width + 2 cable inlets (SDP series) or 3 cable inlets (SDM series)  
**SF** = 50 mm width + 3 cable inlets

**P:** Plastic casing - **M:** Metal (SM, SDM) / Aluminium (SBM, SCM) casing

**Electrical connection**

**1:** cable inlets for PG13.5 cable gland  
**2:** cable inlets for 1/2 NPT cable gland \*  
**3:** cable inlets for PG11 cable gland \*\*  
**4:** cable inlets for M16 x 1,5 cable gland \*\*  
**5:** cable inlets for M20 x 1,5 cable gland  
**6:** M12 4 poles connector  
**7:** M12 5 poles connector  
**8:** M12 8 poles connector

**Key operated version**

**Operating heads:** codes 10-80-3000-4000-5000

**Contact block**

**11:** 1 NO + 1 NC contacts  
**02:** 2 NC contacts  
**12P:** 1 NO + 2 NC contacts  
**21P:** 2 NO + 1 NC contacts  
**03P:** 3 NC contacts

**Only for SBM, SCM, SBP series:**

**12:** 1 NO + 2NC contacts  
**21:** 2 NO + 1 NC contacts  
**03:** 3 NC contacts

**Z:** Snap action  
**W:** Slow action (contact dependent)  
**X:** Slow action non-overlapping late make  
**Y:** Slow action overlapping early make

\* In SP... and SDP... series, the 1/2" NPT thread is obtained by the use of a plastic adapter (delivered not mounted).

\*\* Available only for SP/SDP/SM/SDM Series

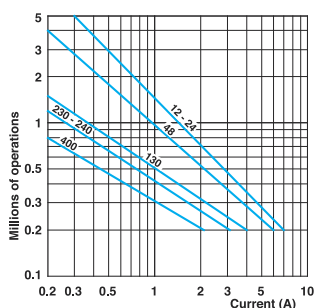
## Safety Limit Switches with separate actuator - Technical Data

	SP / SBP / SDP / SFP Series	SM / SBM / SCM / SDM Series
<b>Standards</b>	IEC 60947-5-1, EN 60947-5-1 UNI EN ISO 14119	
<b>Certifications - Approvals</b>	UL - CSA - IMQ - EAC - CCC	
<b>Air temperature</b> near the device		
- during operation	- 25 ... + 70	
- for storage	- 30 ... + 80	
<b>Mounting positions</b>	All positions are authorised	
<b>Protection against electrical shocks</b> (acc. to IEC 61140)	Class II	Class I
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	IP 65	IP 66

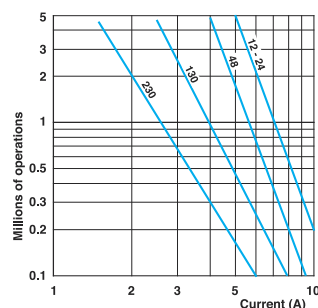
### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b> - according to IEC 60947-1 and EN 60947-1 - according to UL 508 and CSA C22-2 n° 14	500 V (degree of pollution 3) (400 V for contacts type Z02, X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for SM/SDM series and contacts type X12P, X21P, W03P)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (according to IEC 60947-1 and EN 60947-1)	kV	6
<b>Conventional free air thermal current <math>I_{th}</math></b> (according to IEC 60947-5-1) $\theta < 40$ °C	A	10
<b>Short-circuit protection</b> $U_e < 500$ V a.c. - gG (gl) type fuses	A	10
<b>Rated operational current</b>		
$I_e$ / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz A 120 V - 50/60 Hz A 400 V - 50/60 Hz A	10 6 4 (1.8A for contacts type X12, X21, W03)
$I_e$ / DC-13 (according to IEC 60947-5-1)	24 V - d.c. A 125 V - d.c. A 250 V - d.c. A	6 (2.8A for contacts type X12, X21, W03) 0.55 0.4 (0.27A for contacts type X12, X21, W03)
<b>Switching frequency</b>	Cycles/h	3600
<b>Load factor</b>		0.5
<b>Resistance between contacts</b>	m $\Omega$	25
<b>Connecting terminals</b>	M3.5 (+, -) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)	
<b>Terminal for protective conductor</b>	- M3.5 (+, -) pozidriv 2 screw with cable clamp	
<b>Connecting capacity</b>	1 or 2 x mm <sup>2</sup>	0.34 ... 2.5 (0.34... 1.5 for 3 poles contacts type)
<b>Terminal marking</b>	According to IEC 60947-5-1	
<b>Mechanical durability</b>	1 million of operations	
<b>Electrical durability</b> (according to IEC 60947-5-1)	Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)	
<b>B10d</b>	2 million of operations	

AC-15 - Snap action



AC-15 - Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W



## Safety Limit Switches with separate actuator - Technical Data

### Technical data approved by IMQ

<b>Standards</b>	Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards	
<b>Degree of protection</b>	IP 65 (SP/SDP/SBP series), IP 66 (SM/SDM/SBM/SCM series)	
<b>Rated insulation voltage <math>U_i</math></b>	500 V (degree of pollution 3) (400 V for contacts type Z02, X12P, X21P, W03P)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV	
<b>Conventional free air thermal current <math>I_{th}</math></b>	10 A	
<b>Short-circuit protection - gG (gl) type fuses</b>	10 A	
<b>Rated operational current</b>		
$I_e$ / AC-15	24 V - 50/60 Hz 400 V - 50/60 Hz	10 A 4 A (1.8A for contacts type X12, X21, W03)
$I_e$ / DC-13	24 V - d.c. 125 V - d.c. 250 V - d.c.	6 A (2.8A for contacts type X12, X21, W03) 0,55 A 0.4 A (0.27A for contacts type X12, X21, W03)

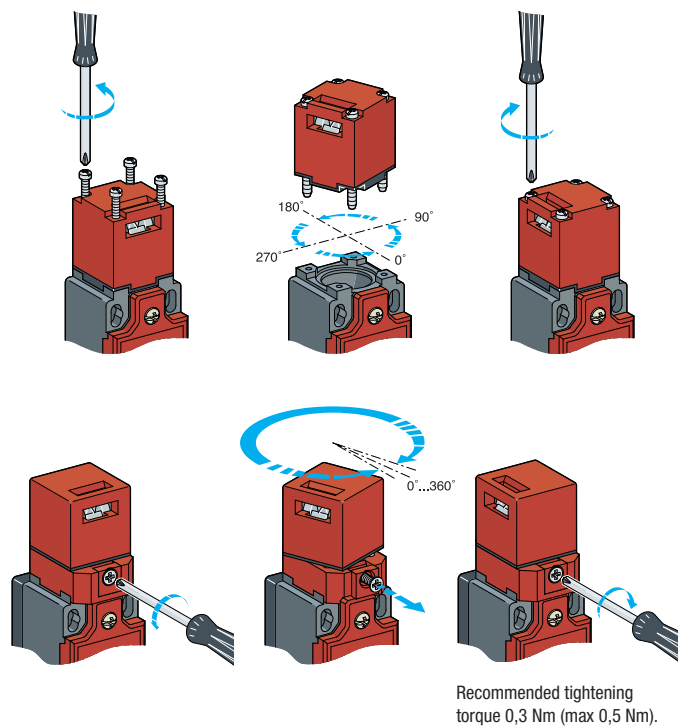
### Technical data approved by UL

<b>Standards</b>	Devices conform with UL 508	
<b>Contact blocks type Z11, X11, Y11, W02 and Z02</b>		
<b>Utilization categories</b>	A600, Q600 (A300, Q300 when installed in SM/SDM series)	
<b>Contact blocks type X12, X21, W03</b>		
<b>Utilization categories</b>	A600, Q600	
<b>Contact blocks type X12P, X21P and W03P</b>		
<b>Utilization categories</b>	A300, Q300	
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.		
For the complete list of approved products, contact our technical department		

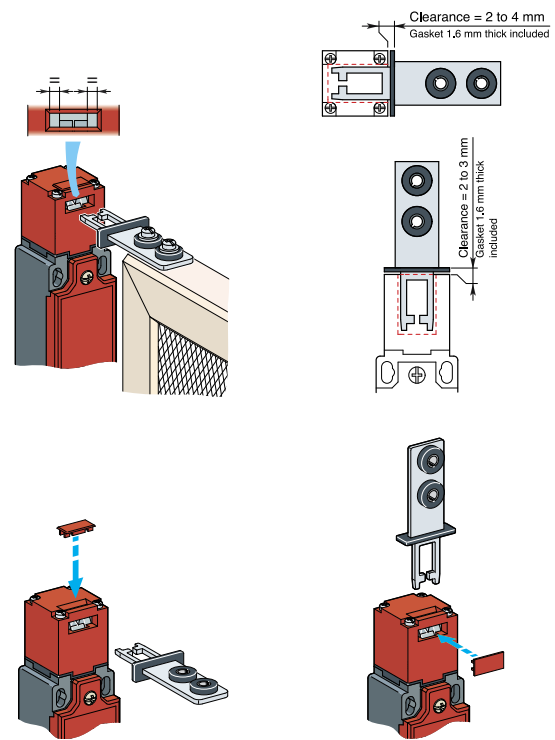
### Implementation

#### Operating head orientation

The head can be rotated each 90°. Recommended tightening torque 0,5 Nm (max 0,8 Nm).



#### Key adjustment



**Download**  
Instruction sheet – Safety limit switches with separated actuator  
CE declaration

Polymeric casing - IP65

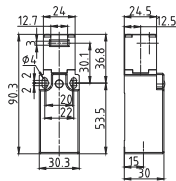
**Electrical connection:**

Replace the symbol “•” with the number of the thread desired

- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 6: M12 4 poles connector
- 7: M12 5 poles connector
- 8: M12 8 poles connector

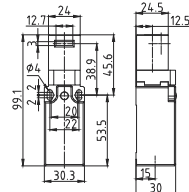
Operating keys to be ordered separately (see page 9)

**K10 Adjustable head 90° (replaces K20)**



Min. actuating force	15 N (30N ⊖)
Weight	80 g
Operating diagram	Page 71

**K80 Fully turnable (replaces K120)**



Min. actuating force	15 N (30N ⊖)
Weight	90 g
Operating diagram	Page 71

**Contact Blocks**

Z11 (1NO+1NC)	SP•K10Z11	SP•K80Z11
X11 (1NO+1NC)	SP•K10X11	SP•K80X11
Y11 (1NO+1NC)	SP•K10Y11	SP•K80Y11
W02 (2NC)	SP•K10W02	SP•K80W02
Z02 (2NC)	SP•K10Z02	SP•K80Z02
X12P (1NO+2NC)	SP•K10X12P	SP•K80X12P
X21P (2NO+1NC)	SP•K10X21P	SP•K80X21P
W03P (3NC)	SP•K10W03P	SP•K80W03P

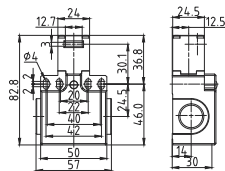
**Electrical connection:**

Replace the symbol “•” with the number of the thread desired

- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

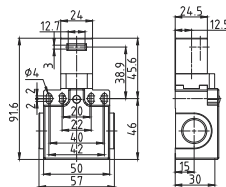
Operating keys to be ordered separately (see page 9)

**K10 Adjustable head 90° (replaces K20)**



Min. actuating force	15 N (30N ⊖)
Weight	110 g
Operating diagram	Page 71

**K80 Fully turnable (replaces K120)**



Min. actuating force	15 N (30N ⊖)
Weight	120 g
Operating diagram	Page 71

**Contact Blocks**

Z11 (1NO+1NC)	SDP•K10Z11	SDP•K80Z11
X11 (1NO+1NC)	SDP•K10X11	SDP•K80X11
Y11 (1NO+1NC)	SDP•K10Y11	SDP•K80Y11
W02 (2NC)	SDP•K10W02	SDP•K80W02
Z02 (2NC)	SDP•K10Z02	SDP•K80Z02
X12P (1NO+2NC)	SDP•K10X12P	SDP•K80X12P
X21P (2NO+1NC)	SDP•K10X21P	SDP•K80X21P
W03P (3NC)	SDP•K10W03P	SDP•K80W03P



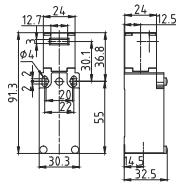
### Electrical connection:

Replace the symbol “•” with the number of the thread desired

- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 7: M12 5 poles connector
- 8: M12 8 poles connector

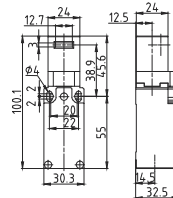
Operating keys to be ordered separately (see page 9)

### K10 Adjustable head 90° (replaces K20)



Min. actuating force	15 N (30N ⊖)
Weight	175 g
Operating diagram	Page 71

### K80 Fully turnable (replaces K120)



Min. actuating force	15 N (30N ⊖)
Weight	185 g
Operating diagram	Page 71

### Contact Blocks

Z11 (1NO+1NC)	SM•K10Z11	SM•K80Z11
X11 (1NO+1NC)	SM•K10X11	SM•K80X11
Y11 (1NO+1NC)	SM•K10Y11	SM•K80Y11
W02 (2NC)	SM•K10W02	SM•K80W02
Z02 (2NC)	SM•K10Z02	SM•K80Z02
X12P (1NO+2NC)	SM•K10X12P	SM•K80X12P
X21P (2NO+1NC)	SM•K10X21P	SM•K80X21P
W03P (3NC)	SM•K10W03P	SM•K80W03P

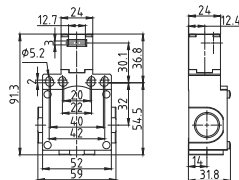
### Electrical connection:

Replace the symbol “•” with the number of the thread desired

- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

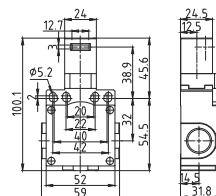
Operating keys to be ordered separately (see page 9)

### K10 Adjustable head 90° (replaces K20)



Min. actuating force	15 N (30N ⊖)
Weight	235 g
Operating diagram	Page 71

### K80 Fully turnable (replaces K120)



Min. actuating force	15 N (30N ⊖)
Weight	245 g
Operating diagram	Page 71

### Contact Blocks

Z11 (1NO+1NC)	SDM•K10Z11	SDM•K80Z11
X11 (1NO+1NC)	SDM•K10X11	SDM•K80X11
Y11 (1NO+1NC)	SDM•K10Y11	SDM•K80Y11
W02 (2NC)	SDM•K10W02	SDM•K80W02
Z02 (2NC)	SDM•K10Z02	SDM•K80Z02
X12P (1NO+2NC)	SDM•K10X12P	SDM•K80X12P
X21P (2NO+1NC)	SDM•K10X21P	SDM•K80X21P
W03P (3NC)	SDM•K10W03P	SDM•K80W03P

## Key operated

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

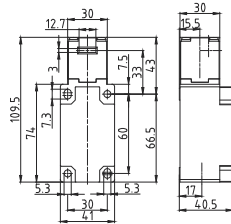
1: Cable gland PG 13.5

2: Cable gland 1/2” NPT

5: Cable gland M20 x 1,5

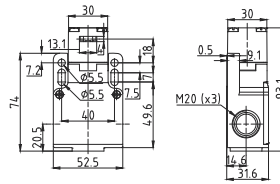
Operating keys to be ordered separately (see page 9)

### K3000 Adjustable head 90°



Min. actuating force	15 N (30N ⊖)
Weight	155 g
Operating diagram	Page 71

### K5000 Adjustable head 90°



Initial minimum actuating force	60 N (90N ⊖)
Weight	140 g
Operating diagram	Page 71

### Contact Blocks

Z11 (1NO+1NC)	SBP•K3000Z11	SFP5K5000Z11
X11 (1NO+1NC)	SBP•K3000X11	SFP5K5000X11
Y11 (1NO+1NC)	SBP•K3000Y11	SFP5K5000Y11
W02 (2NC)	SBP•K3000W02	SFP5K5000W02
Z02 (2NC)	SBP•K3000Z02	SFP5K5000Z02
X12 (1NO+2NC)	SBP•K3000X12	SFP5K5000X12P
X21 (2NO+1NC)	SBP•K3000X21	SFP5K5000X21P
W03 (3NC)	SBP•K3000W03	SFP5K5000W03P

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

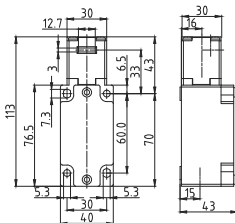
1: Cable gland PG 13.5

2: Cable gland 1/2” NPT

5: Cable gland M20 x 1,5

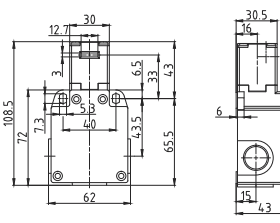
Operating keys to be ordered separately (see page 9)

### K4000 Adjustable head 90°



Min. actuating force	15 N (30N ⊖)
Weight	225 g
Operating diagram	Page 71

### K4000 Adjustable head 90°



Min. actuating force	15 N (30N ⊖)
Weight	220 g
Operating diagram	Page 71

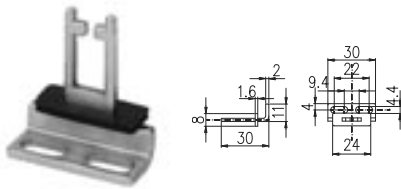
### Contact Blocks

Z11 (1NO+1NC)	SBM•K4000Z11	SCM•K4000Z11
X11 (1NO+1NC)	SBM•K4000X11	SCM•K4000X11
Y11 (1NO+1NC)	SBM•K4000Y11	SCM•K4000Y11
W02 (2NC)	SBM•K4000W02	SCM•K4000W02
Z02 (2NC)	SBM•K4000Z02	SCM•K4000Z02
X12 (1NO+2NC)	SBM•K4000X12	SCM•K4000X12
X21 (2NO+1NC)	SBM•K4000X21	SCM•K4000X21
W03 (3NC)	SBM•K4000W03	SCM•K4000W03

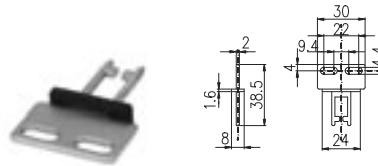
## Operating keys (to be ordered separately)

For operating head models K10 and K80 (dimensions in mm.)

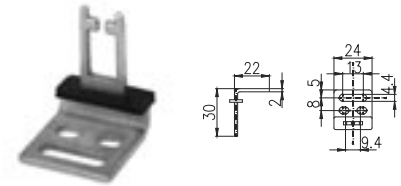
Order code 3: Bent key



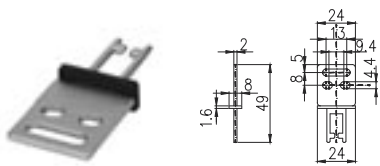
Order code 4: Flat key



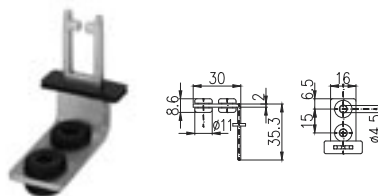
Order code 5: Bent key



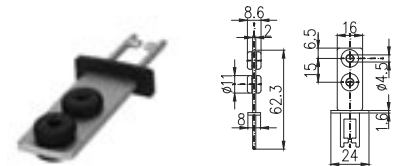
Order code 6: Flat key



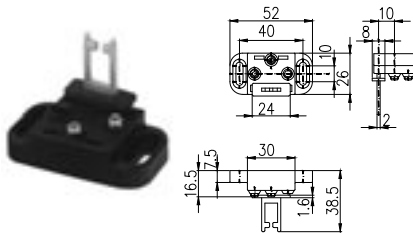
Order code 7: Shock absorbing bent key



Order code 8: Shock absorbing flat key

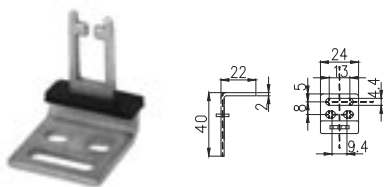


Order code 9: Adjustable joint key

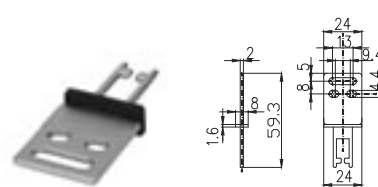


For operating head models K3000, K4000, K5000 (dimensions in mm.)

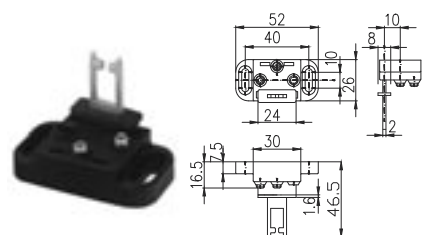
Order code 45: Bent key



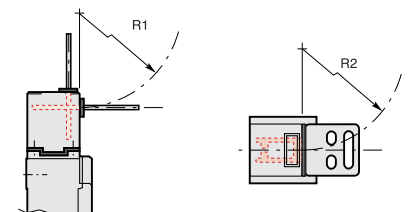
Order code 46: Flat key



Order code 49: Adjustable joint key



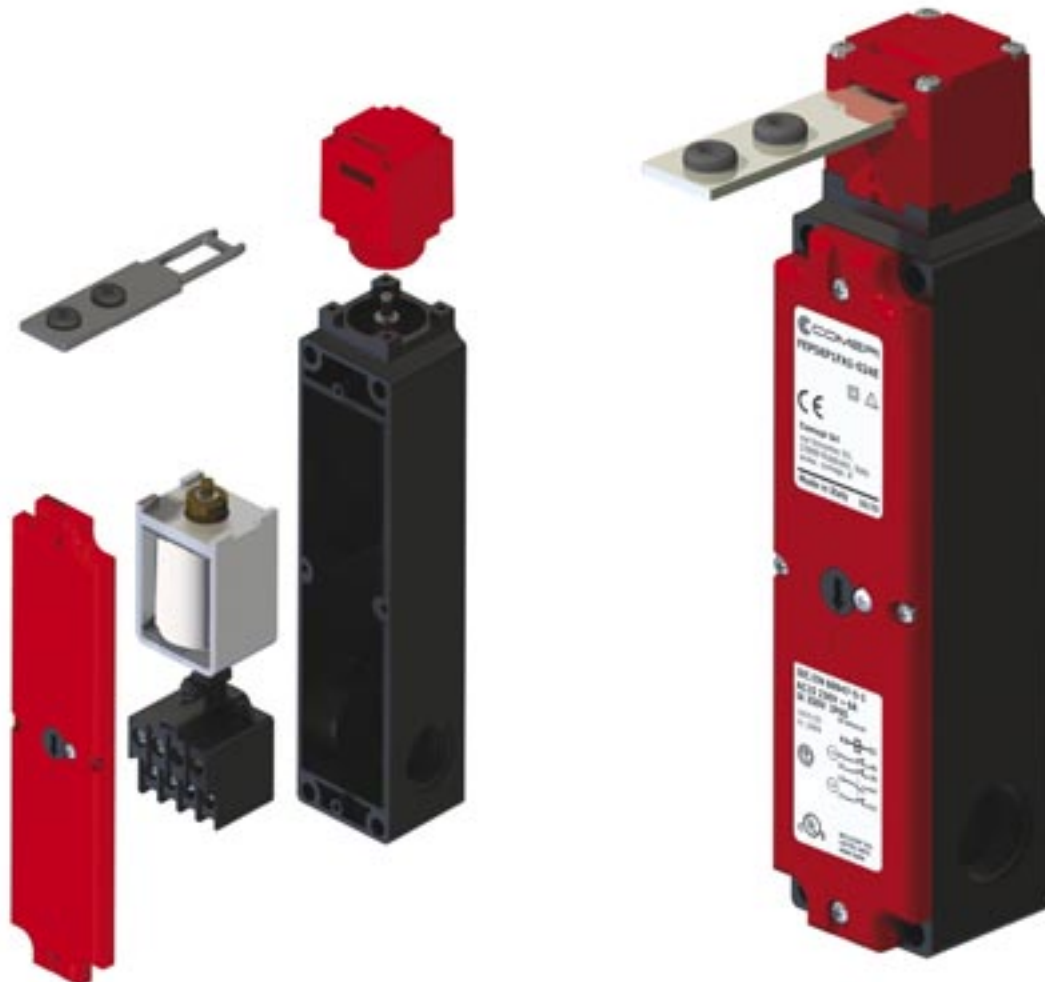
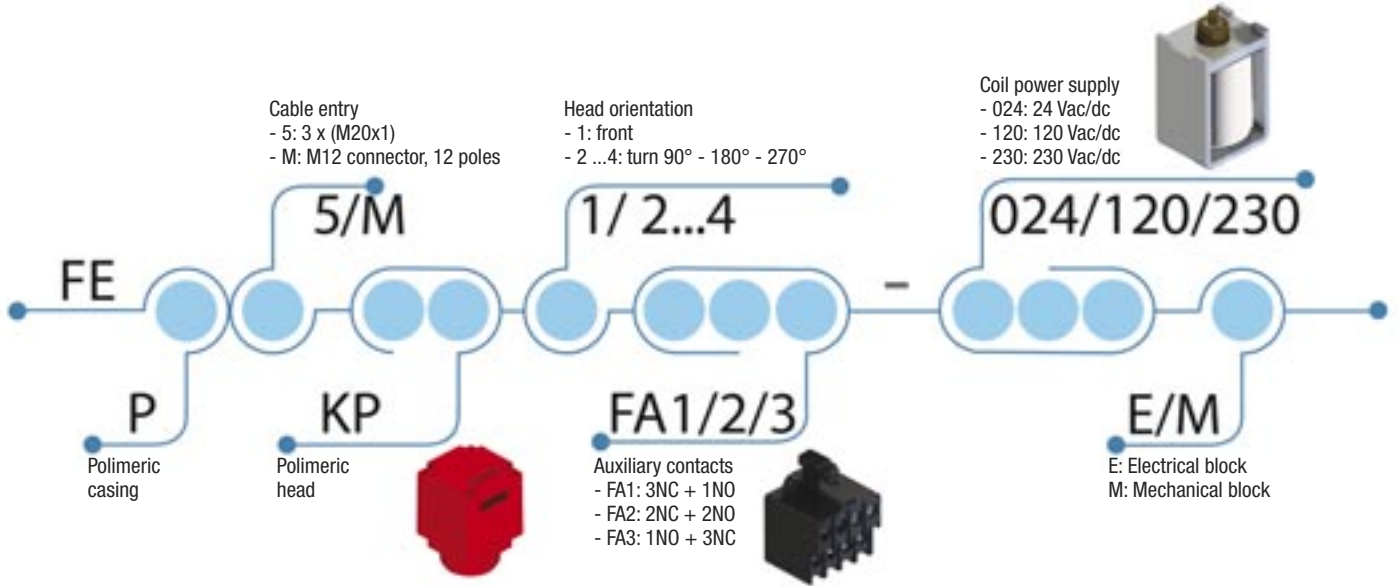
### Minimum values [mm]



	KEY 3	KEY 4	KEY 5/45	KEY 6/46	KEY 7	KEY 8	KEY 9/49
R1	400	400	400	400	250	350	180
R2	400	400	400	400	350	350	200

## Electromagnetic safety devices with separate actuator

Approvals: UL 508 / EN 60947-5-1



## Electromagnetic safety devices with separate actuator

### Head orientation:

Replace the symbol “•” with the number of the orientation desired

- 1: 0° standard
- 2: 90° right
- 3: 180° right
- 4: 270° right

Operating keys to be ordered separately (see page 15)

### FEP-M Mechanical interlock



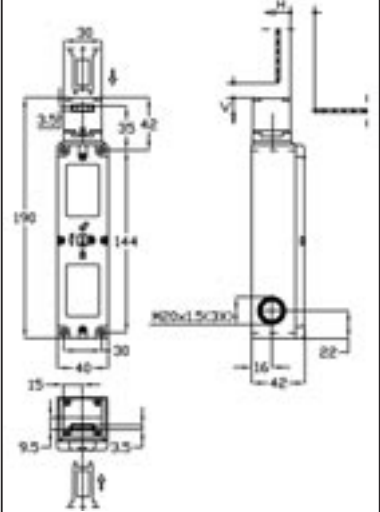
Min. actuating force (extraction)	15 N (30N)
Retention force	1200 N
Weight	0,5 kg

### FEP-E Electrical interlock



Min. actuating force (extraction)	15 N (30N)
Retention force	1200 N
Weight	0,5 kg

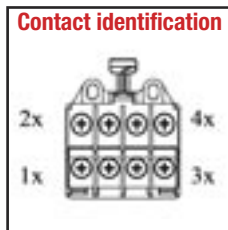
### Dimensions



### Contact Blocks

Contact Blocks	FEP-M Mechanical interlock	FEP-E Electrical interlock
<b>FA1</b> (3NC+1NA)	FEP5KP•FA1-024M FEP5KP•FA1-120M FEP5KP•FA1-230M	FEP5KP•FA1-024E FEP5KP•FA1-120E FEP5KP•FA1-230E
<b>FA2</b> (2NA+2NC)	FEP5KP•FA2-024M FEP5KP•FA2-120M FEP5KP•FA2-230M	FEP5KP•FA2-024E FEP5KP•FA2-120E FEP5KP•FA2-230E
<b>FA3</b> (1NA+3NC)	FEP5KP•FA3-024M FEP5KP•FA3-120M FEP5KP•FA3-230M	FEP5KP•FA3-024E FEP5KP•FA3-120E FEP5KP•FA3-230E

## Contact elements definition

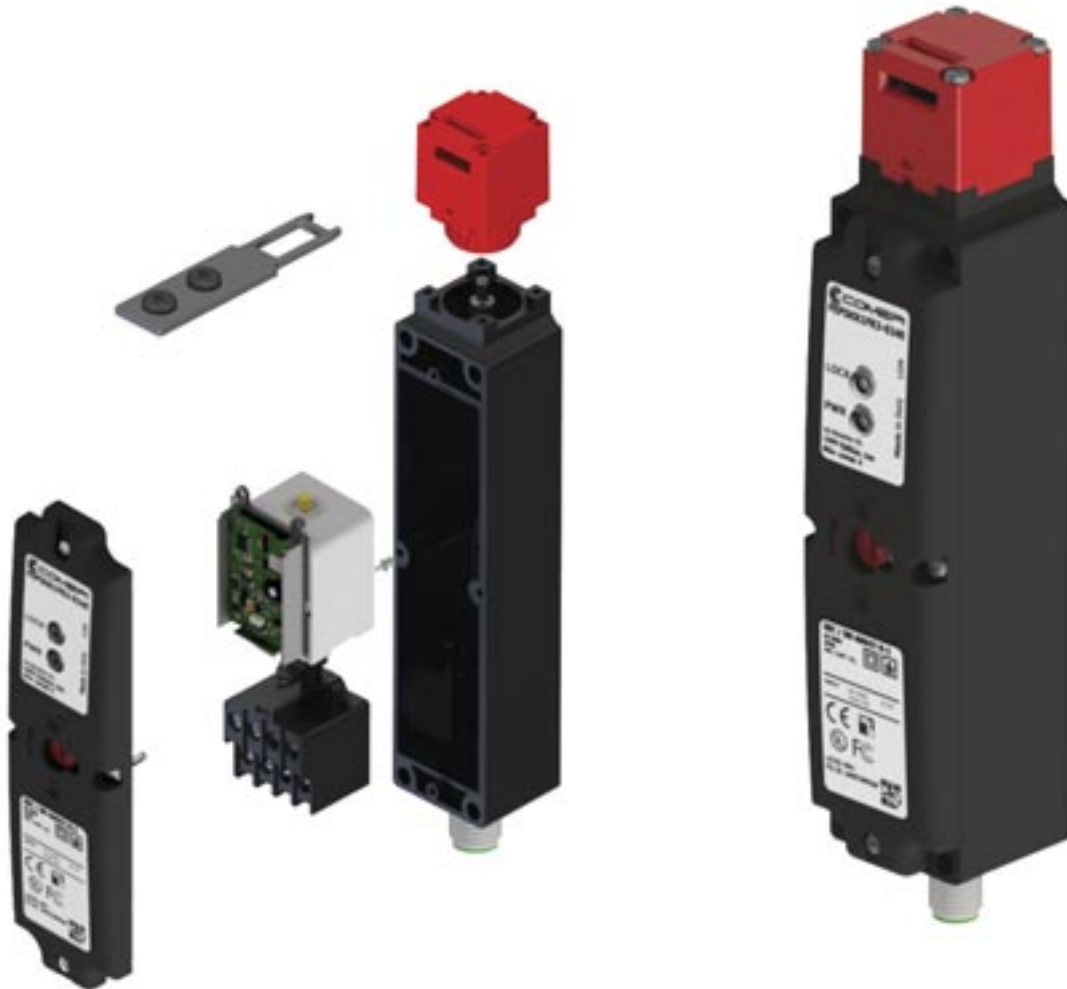
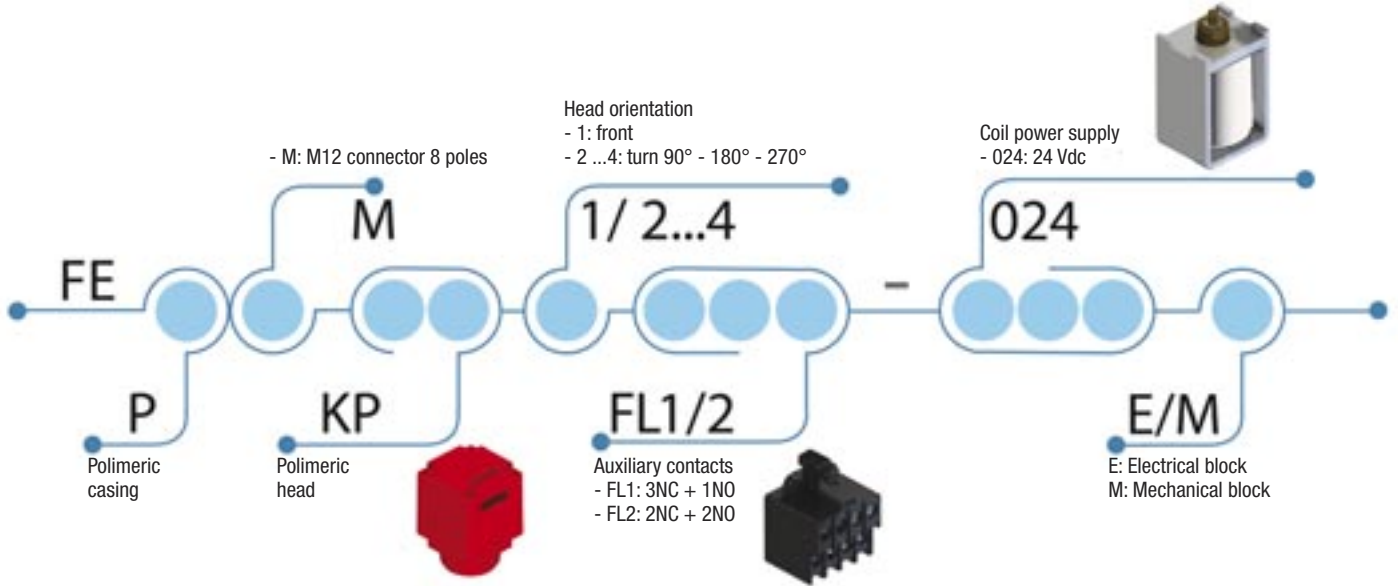


Type	Mechanical interlock			Electrical interlock*		
	Actuator	Solenoid	Solenoid	Actuator	Solenoid	Solenoid
Actuator	Inserted and locked	Inserted and unlocked	Not inserted	Inserted and locked	Inserted and unlocked	Not inserted
Solenoid	Not excited	Excited	-	Excited	Not excited	-
Contact elements	Actuation					
<b>FA1</b> 1 contact moved by actuator + 3 contacts moved by solenoid	Actuator					
	Solenoid					
	Solenoid					
	Solenoid					
<b>FA2</b> 1 contact moved by actuator + 3 contacts moved by solenoid	Actuator					
	Solenoid					
	Solenoid					
	Solenoid					
<b>FA3</b> 2 contact moved by actuator + 2 contacts moved by solenoid	Actuator					
	Solenoid					
	Solenoid					
	Actuator					

\* ATTENTION: in case of lack of voltage the device allows immediate access to the protected area.

## Electromagnetic safety devices with separate actuator

Approvals: UL 508 / EN 60947-5-1





## Electromagnetic safety devices with separate actuator

### Head orientation:

Replace the symbol “•” with the number of the orientation desired

- 1: 0° standard
- 2: 90° right
- 3: 180° right
- 4: 270° right

Operating keys to be ordered separately (see page 15)

### FEP-M Mechanical interlock



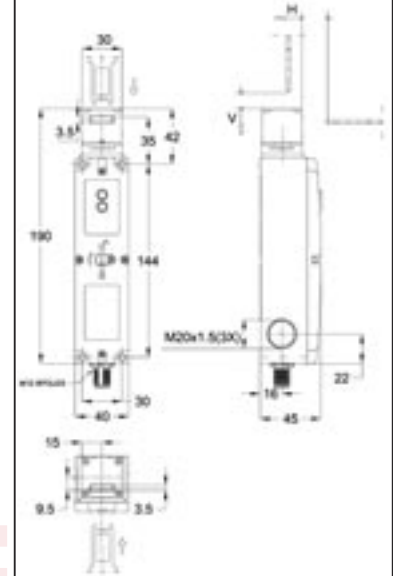
Min. actuating force (extraction)	15 N (30N)
Retention force	1200 N
Weight	0,5 kg

### FEP-E Electrical interlock



Min. actuating force (extraction)	15 N (30N)
Retention force	1200 N
Weight	0,5 kg

### Dimensions



### Contact Blocks

- FL1 (3NC+1NA)
- FL2 (2NA+2NC)

- FEP5KP•FL1-024M
- FEP5KP•FL2-024M

- FEP5KP•FL1-024E
- FEP5KP•FL2-024E

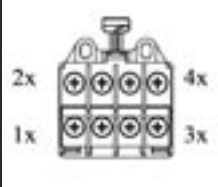
### Wiring diagram of the version with M12 connector



- 1 → 21
- 2 → +24Vdc
- 3 → 41
- 4 → 22
- 5 → 24Vdc output for key inserted
- 6 → 42
- 7 → GND
- 8 → +24Vdc solenoid command input

## Contact elements definition

### Contact identification



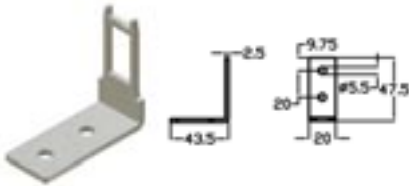
Type	Mechanical interlock			Electrical interlock*			
	Actuator	Solenoid	Solenoid	Actuator	Solenoid	Solenoid	
Actuator	Inserted and locked	Inserted and unlocked	Not inserted	Inserted and locked	Inserted and unlocked	Not inserted	
Solenoid	Not excited	Excited	-	Excited	Not excited	-	
Contact elements	Actuation						
FL1 1 contact moved by actuator + 2 contacts moved by solenoid	Actuator						
	Solenoid						
	Solenoid						
FL2 1 contact moved by actuator + 2 contacts moved by solenoid	Actuator						
	Solenoid						
	Solenoid						

\* ATTENTION: in case of lack of voltage the device allows immediate access to the protected area.

## Operating keys (to be ordered separately)

For operating head model KP (dimensions in mm.)

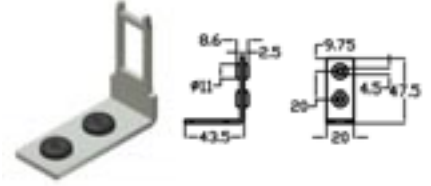
Order code 25: Bent key



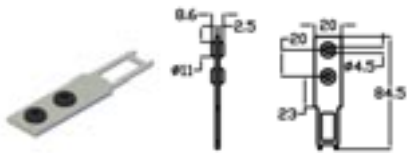
Order code 26: Flat key



Order code 27: Shock absorbing bent key



Order code 28: Shock absorbing flat key



Order code 29: Adjustable joint key



## Electromagnetic Safety Devices - Accessories

8 poles PVC cable with M12 female Connector



Code	Length
XX8A030SM	3 m



Code	Length
XX8D030SM	3 m
XX8D050SM	5 m

## Electromagnetic safety devices with separate actuator - Description

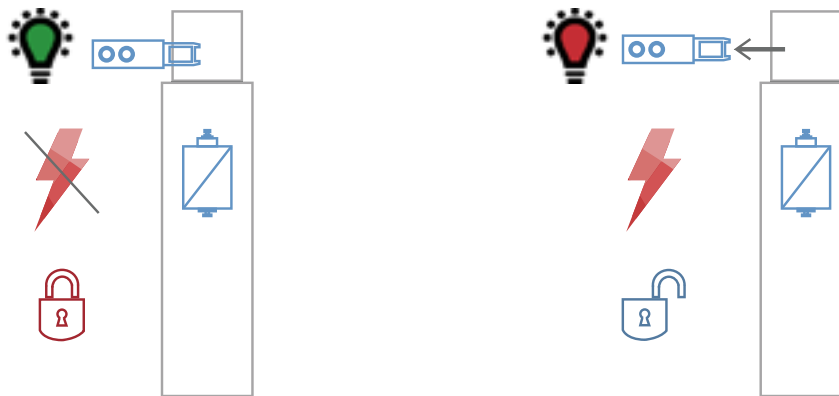
### Applications

This device is useful for guarantee the safety of the operator in case of machines where the hazardous conditions remains for a while time after the generation of the stop signal, because of the mechanical inertia of moving parts, components under pressure or with high temperatures. This device, when used individually, is not suitable for applications in machines where the operator can enter inside the protected area with his whole body, because of the possibility of accidental closing of the protection fences after the operator entry. In order to test the proper operations, verify the correct insertion of the actuator in the operating head and start the machine by closing the protection. In this conditions must be impossible to open the protection. With the machine stopped and disconnected protection, must be impossible to start the machine.

### Safety warnings

Safety switches perform a human protection function. The wrong installation can cause serious danger situations, as well as the manumission of the device and of the entire safety system. The device must never be evaded or manumitted in every way. To prevent easy tampering, we recommend to install the device in a place difficult to access by unauthorized personnel, by using physical impediments or tricks to make any tampering more difficult.

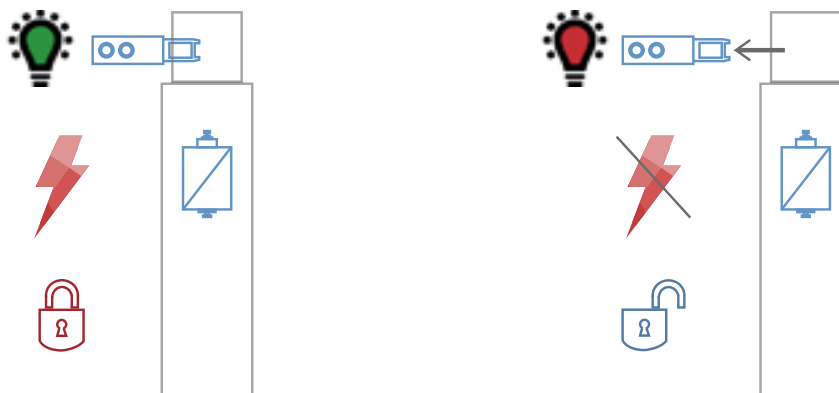
- M MECHANICAL interlock**
- Actuator locked when the solenoid is not activated.
  - Retention force at locked actuator 1200N.
  - The release is possible by supplying the device.
  - Green LED when locked.



**01 DANGEROUS SITUATION**  
ex: mechanical parts in movement

**02 SAFETY SITUATION**  
ex: turn off machinery, end of inertia

- E ELECTRICAL interlock**
- Actuator locked when the solenoid is activated.
  - Retention force at locked actuator 1200N.
  - The release is possible by switching off the power supply.
  - ATTENTION! in case of lack of voltage, the device allows immediate access to the protected area.
  - Green LED when locked.



**01 DANGEROUS SITUATION**  
ex: mechanical parts in movement

**02 SAFETY SITUATION**  
ex: turn off machinery, end of inertia

## Electromagnetic safety devices with separate actuator - Technical Data

		FEP Series
<b>Standards</b>		IEC 60947-1, EN 60947-5-1 UNI EN ISO 14119, EN 60204
<b>Certifications - Approvals FEP</b>		UL - IMQ - CCC - CE
<b>Certifications - Approvals FEP LED</b>		UL - CE
<b>Air temperature near the device</b>		
- during operation	°C	- 25 ... + 55
- for storage	°C	- 30 ... + 80
<b>Mounting positions</b>		Head not removable by the user
<b>Protection against electrical shocks</b> (according to IEC 61140)		Class II
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)		IP 65

### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b>				
- according to IEC 60947-1 and EN 60947-1 <b>FEP</b>				250 V (pollution degree 3)
- according to UL 508 <b>FEP</b>				A 300, Q 300
- according to IEC 60947-1 and EN 60947-1 <b>FEP LED / FEP M12</b>				30 V (pollution degree 3)
- according to UL 508 <b>FEP LED / FEP M12</b>				Class II
<b>Rated impulsive withstand voltage <math>U_{imp}</math></b>				
(according to IEC 60947-1 and EN 60947-1) <b>FEP</b>	kV			2.5
(according to IEC 60947-1 and EN 60947-1) <b>FEP LED / FEP M12</b>	kV			0.8
<b>Conventional free air thermal current <math>I_{th}</math></b>				
(according to IEC 60947-5-1) $\theta < 40$ °C <b>FEP</b>	A			10
(according to IEC 60947-5-1) $\theta < 40$ °C <b>FEP LED / FEP M12</b>	A			2
<b>Short-circuit protection</b>				
<b><math>U_e &lt; 500</math> V a.c. - gG (gl) type fuses <b>FEP</b></b>	A			10
<b><math>U_e &lt; 500</math> V a.c. - gG (gl) type fuses <b>FEP LED / FEP M12</b></b>	A			2
<b>Rated operational current <b>FEP</b></b>				
<b><math>I_e</math> / AC-15</b> (according to IEC 60947-5-1)	24 V - 50/60 Hz	A		10
	230 V - 50/60 Hz	A		4
<b><math>I_e</math> / DC-13</b> (according to IEC 60947-5-1)	24 V - d.c.	A		4
<b>Rated operational current <b>FEP LED / FEP M12</b></b>				
<b><math>I_e</math> / AC-15</b> (according to IEC 60947-5-1)	24 V - 50/60 Hz	A		2
<b><math>I_e</math> / DC-13</b> (according to IEC 60947-5-1)	24 V - d.c.	A		2
<b>Functional power supply <b>FEP LED</b></b>	V			24 ±10%
<b>Max current <b>FEP LED / FEP M12</b></b>	A			0.5
<b>Max switching frequency</b>	cycles / h			600
<b>Max actuation speed</b>	m/min			20
<b>Resistance between contacts <b>FEP</b></b>	mΩ			25
<b>Resistance between contacts <b>FEP LED / FEP M12</b></b>	mΩ			50
<b>Connecting terminals</b>				M3 screw with cable clamp
<b>Connecting capacity <b>FEP</b></b>	1 o 2 x mm <sup>2</sup>			0.34... 1.5
<b>Connecting capacity <b>FEP LED / FEP M12</b></b>	1 o 2 x mm <sup>2</sup>			M12 connector
<b>Terminal marking</b>				according to IEC 60947-5-1
<b>Mechanical durability</b>	million of operations			1
<b>B10d</b>	million of operations			4

## Electromagnetic safety devices with separate actuator - Technical Data

### Technical data approved by IMQ

<b>Standards</b>	Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards	
<b>Degree of protection</b>	IP 65	
<b>Rated insulation voltage <math>U_i</math></b>	250 V (pollution degree 3)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	2.5 kV	
<b>Conventional free air thermal current <math>I_{th}</math></b>	10 A	
<b>Short-circuit protection - gG (gl) type fuses</b>	10 A	
<b>Rated operational current</b>		
<b><math>I_e</math> / AC-15</b>	24 V - 50/60 Hz	10 A
	230 V - 50/60 Hz	4 A
<b><math>I_e</math> / DC-13</b>	24 V - d.c.	4 A

### Technical data approved by UL

<b>Standards</b>	Devices conform with UL 508
<b>Utilization categories</b>	A300, Q300 / Class II

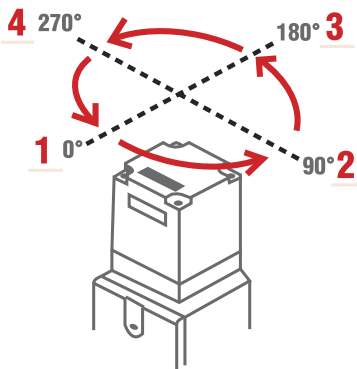
Use 60/75°C copper (Cu) conductor only. Wire gages 14-18 AWG stranded or solid.  
The terminal tightening torque of 7.1 lbs in / 0.8 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.  
Operating ambient temp.: 40°C - Type 1 encl.

For the complete list of approved products, contact our technical department.

### Implementation

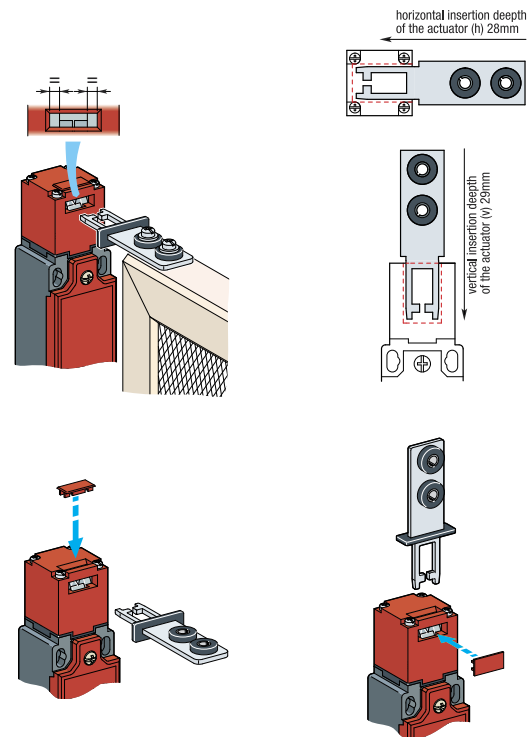
#### Operating head orientation

Head not removable by the user.  
The head can be rotated in factory each 90°.



- 1 0° standard
- 2 90° right
- 3 180° right
- 4 270° right

#### Key adjustment



**Download**  
Instruction sheet – Safety limit switches with separated actuator  
CE declaration

## Electromagnetic safety devices with separate actuator RFID coded

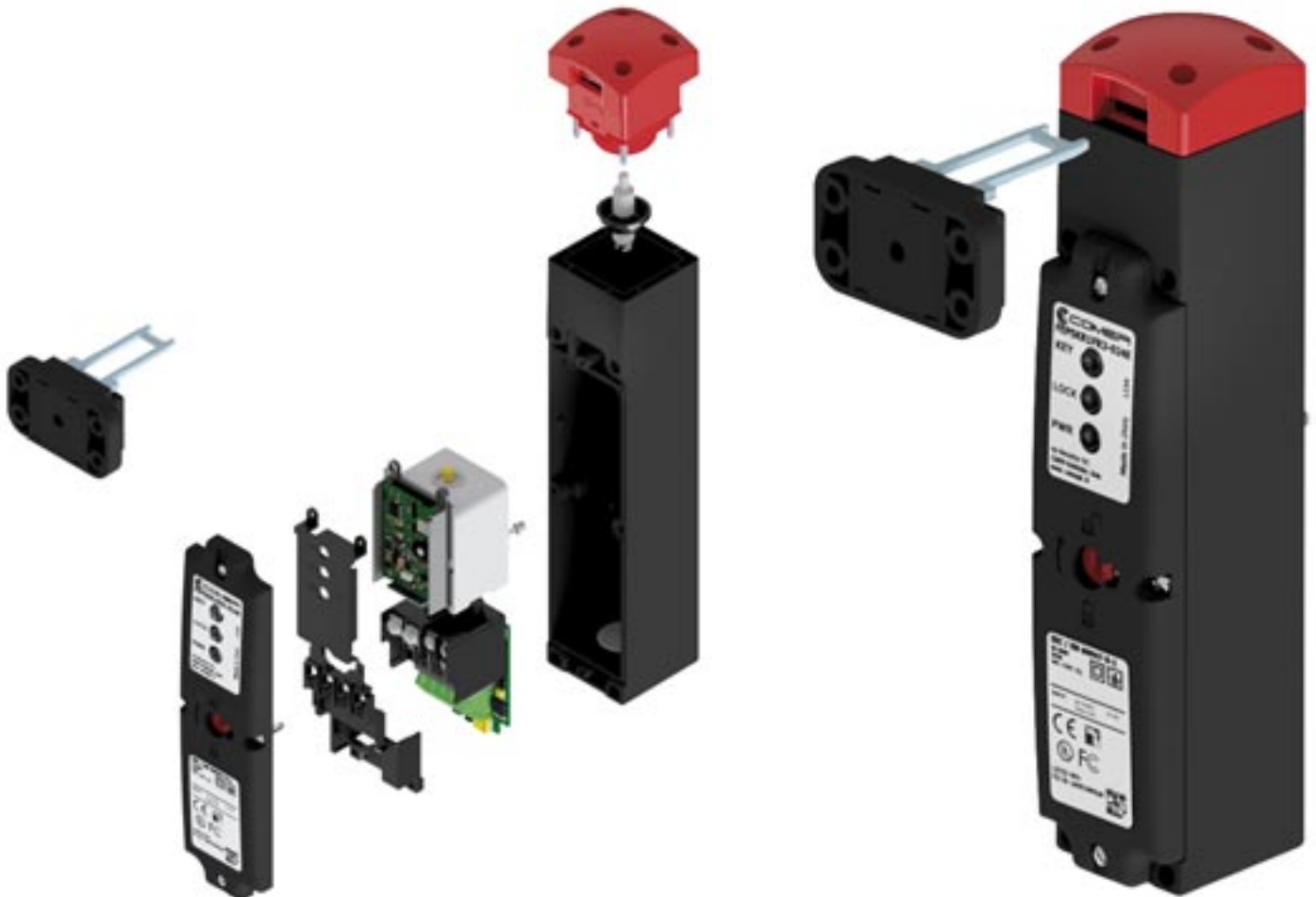
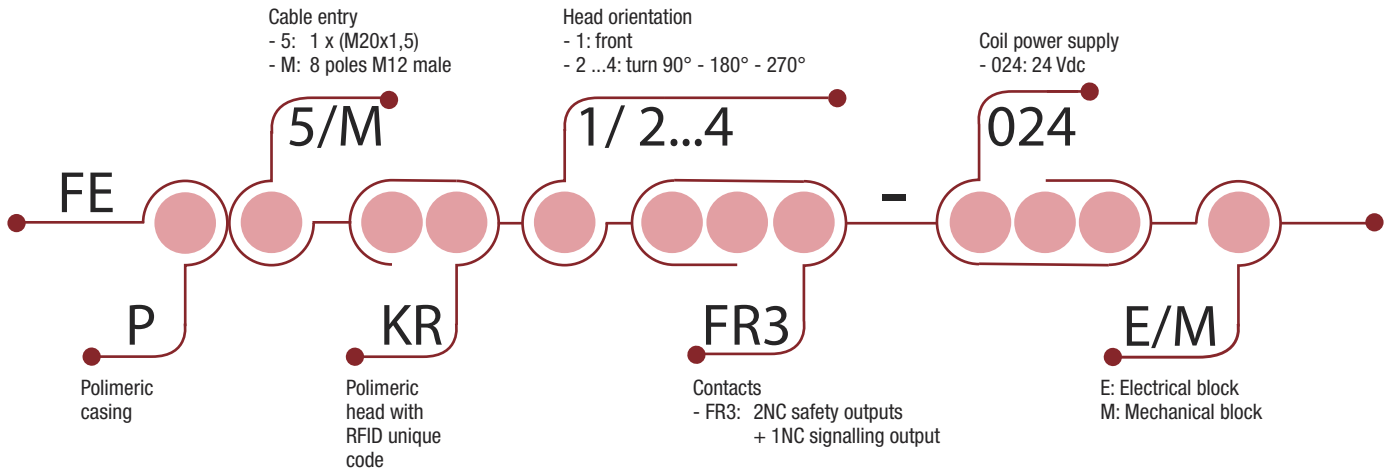
Approvals: UL 508 / EN 60947-5-1



CB Certificate N: DK82445-A1-UL



**29R**  
Adjustable joint key factory paired





## Electromagnetic safety devices with separate actuator RFID coded - Description

### Applications

This device is useful for guarantee the safety of the operator in case of machines where the hazardous conditions remains for a while time after the generation of the stop signal, because of the mechanical inertia of moving parts, components under pressure or with high temperatures. This device, when used individually, is not suitable for applications in machines where the operator can enter inside the protected area with his whole body, because of the possibility of accidental closing of the protection fences after the operator entry. In order to test the proper operations, verify the correct insertion of the actuator in the operating head and start the machine by closing the protection. In this conditions must be impossible to open the protection. With the machine stopped and disconnected protection, must be impossible to start the machine. The FEP-RFID device is supplied with a coded actuator with RFID technology. The actuator supplied has been coupled to the device by the manufacturer, so it is ready to be used. The actuator to use is univocal, it is possible to couple other devices, but each new actuator coupled replaces the previous one. The actuating head cannot be disassembled by the user, so we recommend choosing the right one before buying the product. The actuator supplied is a high coding level actuator according to standard EN ISO 14119, so the measures against any easy bypass strategy for low coding level devices are not necessary.

### Safety warnings

Safety switches perform a human protection function. The wrong installation can cause serious danger situations, as well as the manumission of the device and of the entire safety system. The device must never be evaded or manumitted in every way. To prevent easy tampering, we recommend to install the device in a place difficult to access by unauthorized personnel, by using physical impediments or tricks to make any tampering more difficult.

- M** **MECHANICAL interlock**
- Actuator locked when the solenoid is not activated.
  - Retention force at locked actuator 1200N.
  - The release is possible by supplying the device.



**01 DANGEROUS SITUATION**  
ex: mechanical parts in movement

**02 SAFETY SITUATION**  
ex: turn off machinery, end of inertia

- E** **ELECTRICAL interlock**
- Actuator locked when the solenoid is activated.
  - Retention force at locked actuator 1200N.
  - The release is possible by switching off the power supply.
  - **ATTENTION!** in case of lack of voltage, the device allows immediate access to the protected area.



**01 DANGEROUS SITUATION**  
ex: mechanical parts in movement

**02 SAFETY SITUATION**  
ex: turn off machinery, end of inertia

## Electromagnetic safety devices with separate actuator RFID coded - Technical Data

<b>FEP RFID Series</b>	
<b>Standards</b>	IEC 60947-1, EN 60947-5-1 UNI EN ISO 14119, EN 60204, FCC Part 15
<b>Certifications - Approvals</b>	UL - FCC
<b>Air temperature near the device</b>	
– during operation	°C
– for storage	°C
<b>Mounting positions</b>	Head not removable by the user
<b>Protection against electrical shocks</b> (according to IEC 61140)	Class II
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	IP 65

### Electrical Data - Auxiliary Contacts

<b>Rated insulation voltage <math>U_i</math></b> - according to IEC 60947-1 and EN 60947-1 - according to UL 508		250 V (pollution degree 3) A 300, Q 300
<b>Rated impulsive withstand voltage <math>U_{imp}</math></b> (according to IEC 60947-1 and EN 60947-1)	kV	2.5
<b>Conventional free air thermal current <math>I_{th}</math></b> (according to IEC 60947-5-1) $\theta < 40$ °C	A	10
<b>Short-circuit protection</b> $U_e < 500$ V a.c. - gG (gl) type fuses	A	10
<b>Rated operational current</b> $I_e$ / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz 230 V - 50/60 Hz	A A
		10 4
$I_e$ / DC-13 (according to IEC 60947-5-1)	24 V - d.c.	A
		4
<b>Resistance between contacts</b>	m $\Omega$	25
<b>Connecting terminals</b>		M3 screw with cable clamp
<b>Connecting capacity</b>	1 o 2 x mm <sup>2</sup>	0.34... 1.5
<b>Terminal marking</b>		according to IEC 60947-5-1

### Electrical Data - Power Supply

<b>Rated operating voltage <math>U_e</math></b>	Vdc	24
<b>Power supply tolerance</b>		+/- 10%
<b>Maximum design current</b>	A	0.5
<b>Rated insulation voltage <math>U_i</math></b>	V	32
<b>Rated impulse voltage</b>	kV	1.5
<b>Connection cable nominal area</b>	mm <sup>2</sup>	0.14 ... 1.5
<b>Linking terminals</b>		M2 screw terminals

### RFID sensor features

<b>Switching distance</b>	mm	3
<b>Release distance guaranteed with locked actuator</b>	mm	22
<b>Release distance guaranteed with unlocked actuator</b>	mm	4.5
<b>Switching distance guaranteed</b>	mm	2.5
<b>Maximum switching frequency</b>	Hz	1
<b>Sensor reading time</b>	s	1

### Signalling Led

<b>Led PWR</b>	Power Supply indication
<b>Led LOCK</b>	Lock status
<b>Led KEY</b>	Actuator status

### Mechanical Data

<b>Max switching frequency</b>	cycles / h	600
<b>Max actuation speed</b>	m/min	20
<b>Mechanical durability</b>	million of operations	1

### Safety Data

<b>B10d</b>	million of operations	2
<b>Maximum period of use</b>	years	20
<b>SIL level according to EN 62061</b>		For applications up to SIL3
<b>PL level according to EN ISO 13849-1</b>		For applications up to PLe
<b>Type of interlock according to EN ISO 14119</b>		Type 4
<b>Coding level according to EN 14119</b>		High
<b>Type of emergency release</b>		Manual

## Electromagnetic safety devices with separate actuator RFID coded - Technical Data

### Technical data approved by UL

<b>Standards</b>	Devices conform with UL 508
<b>Utilization categories</b>	A300, Q300

Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid.  
 The terminal tightening torque of 7.1 lbs in / 0.8 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.  
 Operating ambient temp.: 40°C - Type 1 encl.

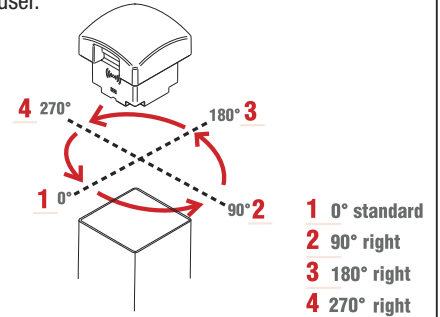
#### FCC Recommendations for USA market

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.  
 No changes shall be made to the equipment without the manufacturer's permission as this may void the user's authority to operate the equipment.

For the complete list of approved products, contact our technical department.

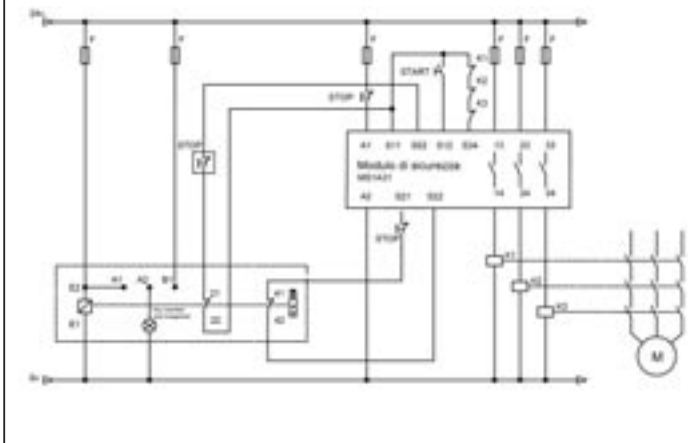
### Operating head orientation

Head not removable by the user.  
 The head can be rotated in factory each 90°.

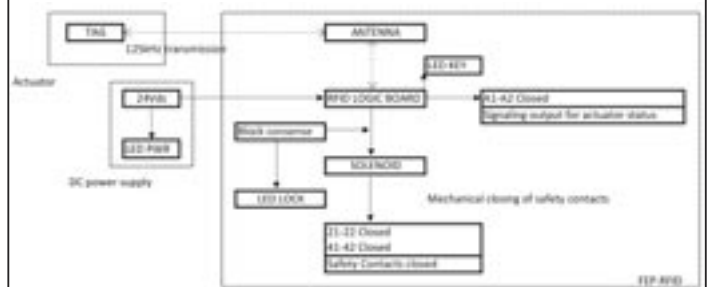


### Implementation

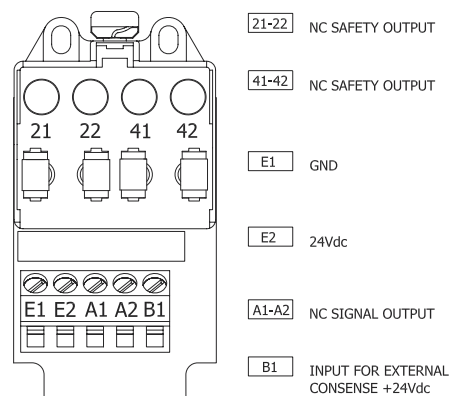
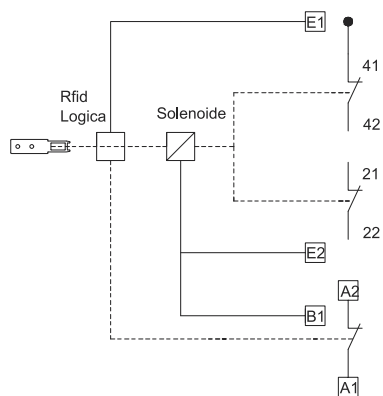
#### Application example with safey module Series MS1A31



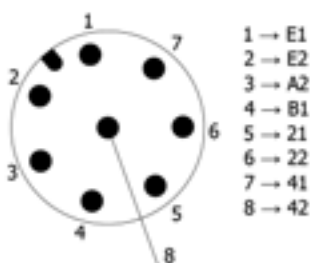
#### Product working logic



#### Wiring diagram of the device



#### Wiring diagram of the version with M12 connector



#### Technical data of the version with 8-pole M12 connector

Insulation voltage $U_i$	30Vdc
Impulse voltage $U_{imp}$	0.8kV
Operating current Contacts 21-22 and 41-42	2A (24Vdc)
Thread	M12x1
Tightening torque	0.6Nm

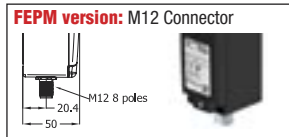
## Electromagnetic safety devices with separate actuator RFID coded

### Head orientation:

Replace the symbol “•” with the number of the orientation desired

- 1: 0° standard
- 2: 90° right
- 3: 180° right
- 4: 270° right

Each device is supplied with its paired operating key.



### FEP RFID-M Mechanical interlock



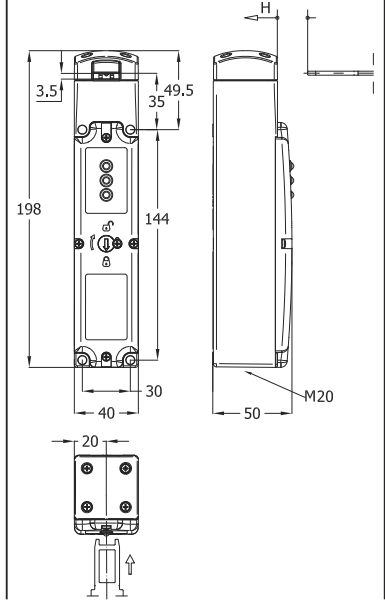
Min. actuating force (extraction) 5 N (30N)  
Retention force 1200 N  
Weight 0,5 kg

### FEP RFID-E Electrical interlock



Min. actuating force (extraction) 5 N (30N)  
Retention force 1200 N  
Weight 0,5 kg

### Dimensions



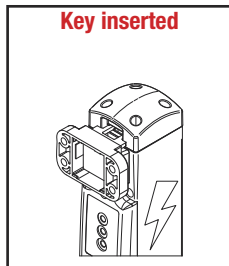
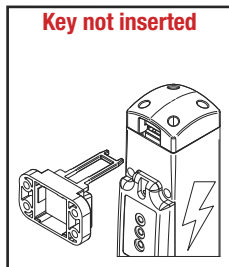
### Contact Blocks

FR3 (2NC safety+1NC signalling)

FEP5KR•FR3-024M

FEP5KR•FR3-024E

## Operating conditions and Led diagnostics

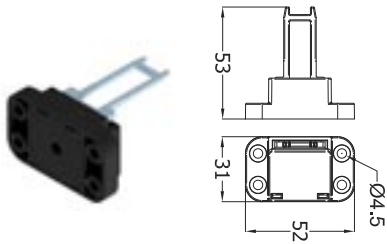


Actuator Status	Power Supply	Lock control	Led Status	Status 21-22 & 41-42	Status A1-A2
Key not inserted	21.6V < V < 26.4V	ON or OFF	● PWR ○ LOCK ○ KEY	Open + Open	Open
Key inserted and recognized	21.6V < V < 26.4V	OFF	● PWR ○ LOCK ● KEY	Open + Open	Closed
Key inserted and recognized	21.6V < V < 26.4V	ON	● PWR ● LOCK ● KEY	Closed + Closed	Closed
Key inserted and not recognized	21.6V < V < 26.4V	ON or OFF	● PWR ○ LOCK ● KEY	Open + Open	Open
Key inserted and RFID absence	21.6V < V < 26.4V	OFF	● PWR ○ LOCK ★ KEY	Open + Open	Open
Key inserted and recognized, subsequent RFID loss	21.6V < V < 26.4V	OFF	● PWR ○ LOCK ★ KEY	Open + Open	Open
Key inserted and recognized, subsequent RFID loss	21.6V < V < 26.4V	ON	● PWR ● LOCK ★ KEY	Close + Open	Open
Key inserted and recognized	21.6V < V < 26.4V With current: I < 50mA - I > 250mA	ON	● PWR ★ LOCK ● KEY	Close + Close (BM) Open + Open (BE)	Closed
Key not inserted	16.8V < V < 21.6V 26.4V < V > 28V	ON or OFF	★ PWR ○ LOCK ○ KEY	Open + Open	Open
Key inserted and recognized	16.8V < V < 21.6V 26.4V < V > 28V	ON or OFF	★ PWR ○ LOCK ● KEY	Open + Open	Closed
Key inserted and recognized	16.8V < V < 21.6V 26.4V < V > 28V	ON	★ PWR ● LOCK ● KEY	Close + Close	Closed
Any	V < 16.8V - V > 28V	ON or OFF	★ PWR ★ LOCK ★ KEY	Close + Close (BM) Open + Open (BE)	Open
Key inserted, coupling in progress	21.6V < V < 26.4V	ON or OFF	● PWR ○ LOCK ★ KEY	Open + Open	Open

● Led ON - ○ Led OFF - ★ Led Flashing

### For operating head model KR (dimensions in mm.)

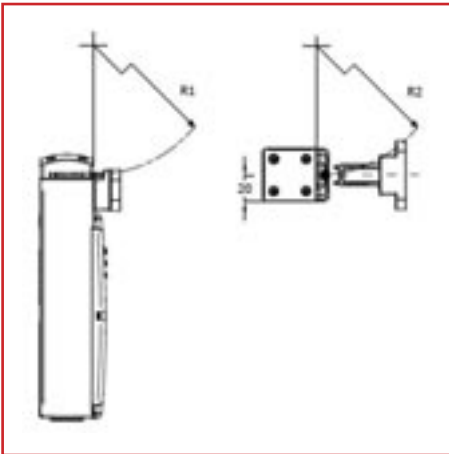
**Order code 29R: Adjustable joint key RFID coded**



#### Actuator pairing

- ① Open the device cover
- ② Give the power supply as specified on this document
- ③ Wait 10 seconds to allow the initialization procedure of the device
- ④ Insert the new actuator inside the operating head
- ⑤ Push with a tool the button below the hole visible on the superior part of the device, to the right of signaling LED
- ⑥ Wait for the green KEY LED to flashing
- ⑦ if the LED KEY remains green the key is correctly recognized, otherwise refer to the problem solving section of this manual.

### Minimum values [mm]



#### Actuator adjustment

Insertion depth H	30 mm
Insertion radius R1	800 mm
Insertion radius R2	600 mm

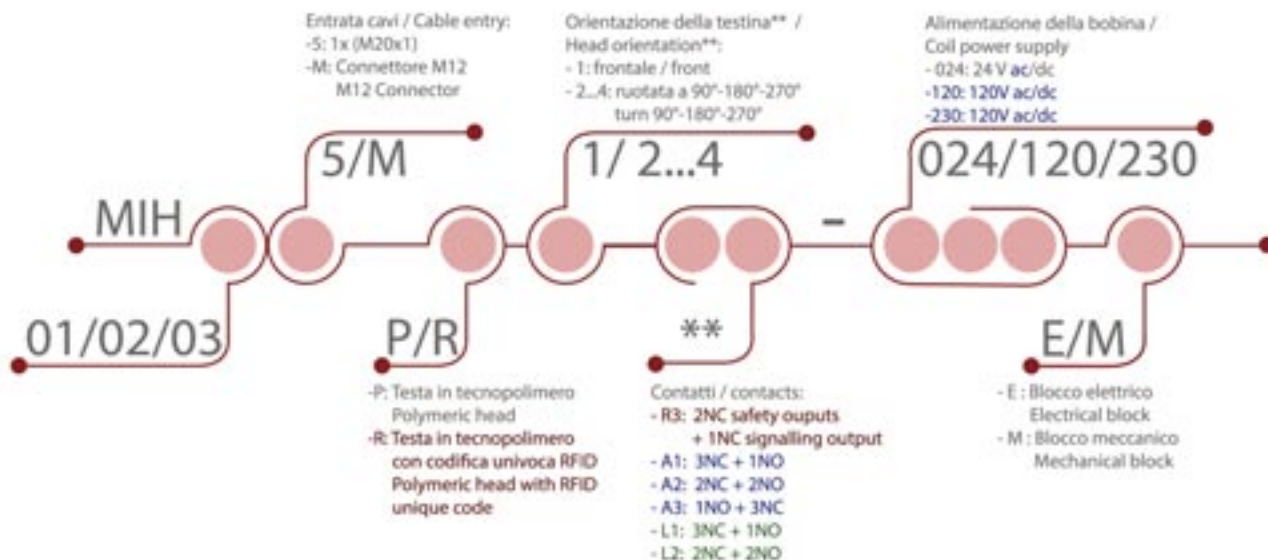


#### Download

Instruction sheet – Safety limit switches with separated actuator  
CE declaration



Crea il tuo codice MIH INTERLOCKING KIT  
Create your MIH INTERLOCKING KIT code



Chiave 29R accoppiata in fabbrica / Key 29R factory paired

\*\*Orientamento della testina eseguita in fabbrica / Head orientation factory made.

RED: ONLY FEP RFID / GREEN: ONLY FEP LED / BLUE: ONLY FEP STANDARD / GREY: ALL TYPES\*\*

\*\*\*La compatibilità di un codice non ne implica l'effettiva realizzabilità. Contattare il nostro ufficio vendite.  
\*\*\*The feasibility of a code number does not mean the effective actuality of a product. Please contact our sales office.



MIH INTERLOCKING KIT: com'è composto?

MIH INTERLOCKING KIT: how it is made?

**01** Viti  
Screws

**02** Piastra  
Base

**03** Interruttore di sicurezza  
Safety switch

**04** Rondella piana  
Plain washer

**05** Viti  
Screws

**06** Viti  
Screws

**07** Attuatore  
Actuator

**08** Piastra  
Base

**09** Viti  
Screws

**10** Maniglia  
Handle

**11** Rosetta grower  
Split washer

**12** Viti  
Screws

**13** Staffa  
Bracket

**14** Viti  
Screws

**15** Perno  
Bolt

**16** Spina elastica  
Elastic spine

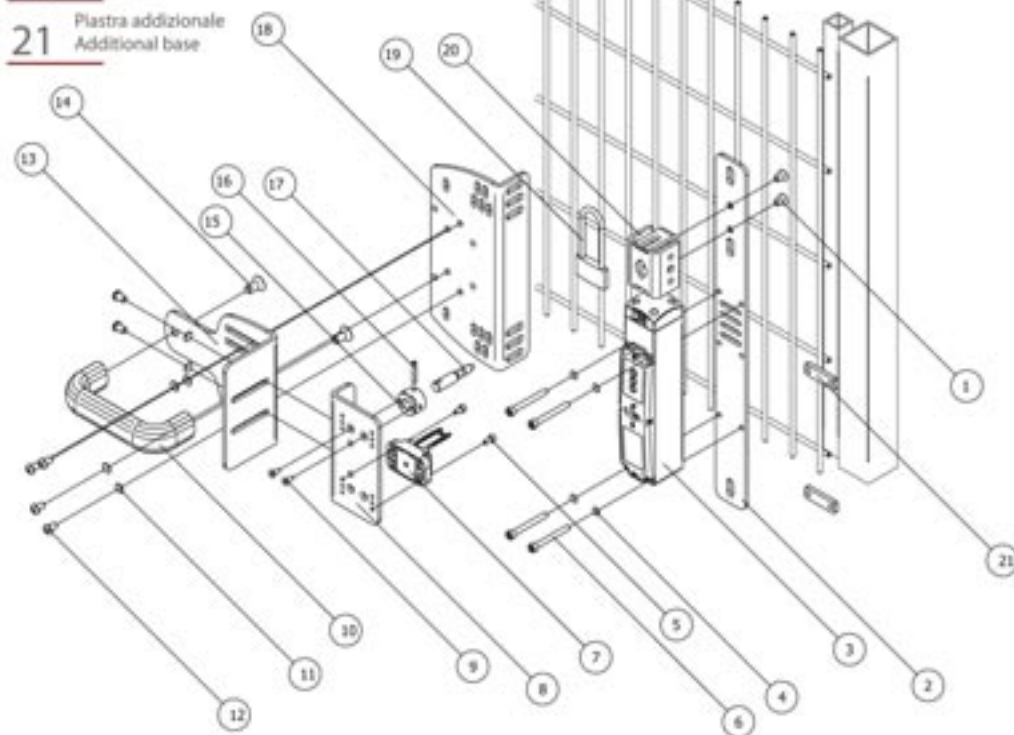
**17** Perno  
Bolt

**18** Staffa  
Bracket

**19** Lucchetto  
Padlock

**20** elemento di centraggio  
centering element

**21** Piastra addizionale  
Additional base





## MIH – main features

### 01 ADATTABILITA' / FLEXIBILITY



La maniglia di interblocco MIH è adattabile a qualsiasi tipologia di riparo usato, anche in presenza di profili di differente spessore. Asole e fori di fissaggio multipli rendono le piastre pienamente regolabili, garantendo compatibilità anche con soluzioni altamente personalizzate. La possibilità di regolazione su tre assi permette di adattarsi ad ogni situazione, raggiungendo una piena fluidità di utilizzo. La maniglia è installabile con qualsiasi dispositivo di interblocco con guardia serie FEP, oltre che con i finecorsa ad attuatore separato prodotti da COMEPI.

MIH Interlocks Handle can be fit to all types of used safety gate, also with profile of different thickness. Slots and multiple fixing holes make bases full settings, ensuring compatibility also with customized solution. The possibility of setting on three axes allows it to fit everything, reaching full fluidity of use. The handle can be installed with every interlocking with guard FEP series, as well as with limit switches with separate actuator manufactured by COMEPI.

### 02 SEMPLICITA' / EASY TO USE



Alla robustezza della maniglia MIH fa certamente controparte la sua semplicità di installazione. Il dispositivo è fornito con tutte le viti ed accessori necessari per montare correttamente la maniglia sul riparo da controllare. Il perno di centraggio garantisce precisione di utilizzo e sicurezza in caso di presenza umana all'interno dell'area da proteggere, previo utilizzo dell'apposito lucchetto fornito col dispositivo. La connessione tramite connettore M12 del dispositivo di interblocco permette un'installazione ancora più facile ed immediata.

Even though handle is strong, it is also easy to install. The device has all the screws and accessories needed for assemble correctly handle on safety gate. The bolt ensures precision during the use and safety in case of human presence inside the protected area, only if the lock was used. Thanks to the connection through M12 connect of interlocking device, the installation is simple and fast.

### 03 ROBUSTEZZA / STRENGTH



La maniglia MIH è un prodotto solido e robusto, progettato per resistere alle più alte sollecitazioni meccaniche. Le piastre usate, di spessore 4mm, garantiscono piena tenuta e solidità, anche di fronte a grosse sollecitazioni applicate sul riparo in stato di blocco. I materiali ed i trattamenti utilizzati garantiscono un'ottima resistenza alla corrosione, rendendo la maniglia adatta all'utilizzo in svariati ambiti applicativi. La presenza dei grani a sfera rende possibile regolare, in condizione di riparo sbloccato, la forza di apertura del riparo da 20 a 140N.

MIH Handle is a solid and strong product, designed to withstand mechanical stress. The bases used, with 4mm of thickness, ensuring very good corrosion strength, making handle suitable for use in the most of applications. Grub screw with balls make possible the regulation, if the repair was unlocked, of the extraction force (from 20 to 140N).

### 04 SOLUZIONE PRONTA ALL'USO / READY TO USE SOLUTION

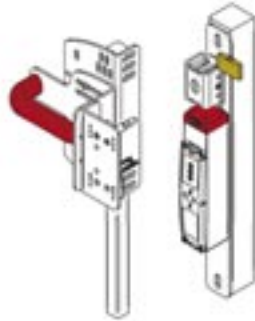


Per rendere il prodotto completo, COMEPI rende disponibili diversi kit di interblocco comprendenti la maniglia MIH ed i dispositivi serie FEP. In questo modo è possibile, usando un unico codice di ordinazione, ottenere un kit pronto all'uso. L'aggiunta a catalogo di accessori e prodotti affini, partendo dai cavi di connessione fino ai moduli di sicurezza, rende possibile creare sistemi personalizzati e velocemente disponibili all'utilizzatore.

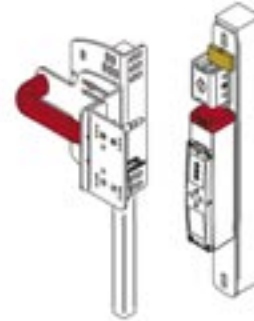
To provide a complete product, COMEPI make available different types of interlocking kit including MIH handle and FEP series devices. In this way it is possible, using a single code of order, you will have a kit ready to use. Related products, like connecting cable and safety modules, make possible to create customized systems, quickly available to the consumer.

## MIH – main features

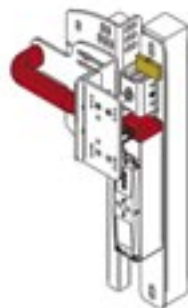
### Principio di funzionamento / Operating features



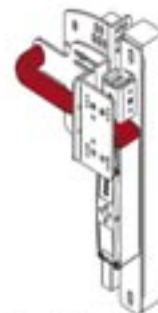
1. Riparo aperto e dispositivo di interblocco FEP pronto all'uso.  
/ Safety gate and interlocking device FEP ready to use



2. Operatore all'interno dell'area protetta: applicazione del lucchetto sul montante  
/ Operator inside the protective-area: application of padlock on uppercut

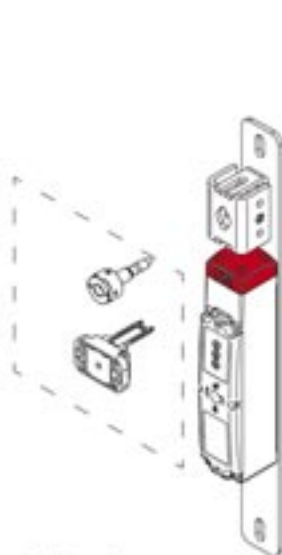


3. In presenza del lucchetto il perno di centraggio viene bloccato, non rendendo possibile l'uso del dispositivo FEP  
/ With padlock, the bolt is locked, so the FEP device won't be use

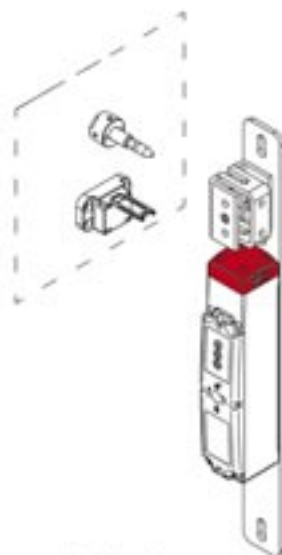


4. Riparo chiuso e lucchetto non inserito: l'azionatore è correttamente inserito nel dispositivo FEP pronto all'uso  
/ Safety gate closed and padlock not used: actuator correctly fitted in FEP device

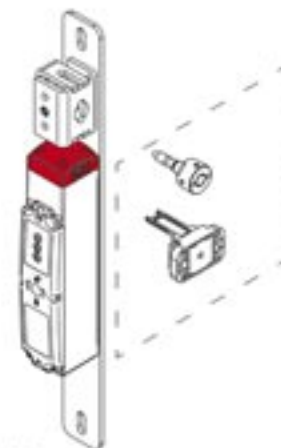
### Elemento di centraggio rotabile / Rolling centering element



Posizione 1:  
configurazione per porta a battente  
Position 1:  
configuration for hinged door



Posizione 2:  
configurazione per porta a scorrimento da destra  
Position 2:  
configuration for sliding door from the right



Posizione 3:  
configurazione per porta a scorrimento da sinistra  
Position 3:  
configuration for sliding door from the left

**Create your kit**

## Maniglia - Serie MIH / Safety Handle - MIH Series

Maniglia per interblocco in metallo, disponibile in tre diverse versioni.  
 MIH01: configurazione completa  
 MIH02: con piastra 18 senza piega  
 MIH03: senza piastra 18 per fissaggio diretto al riparo

Metal interlocking handle, available in three different types.  
 MIH01: complete configuration  
 MIH02: with 18 base, without bent  
 MIH03: without 18 base for direct fixing to the shelter



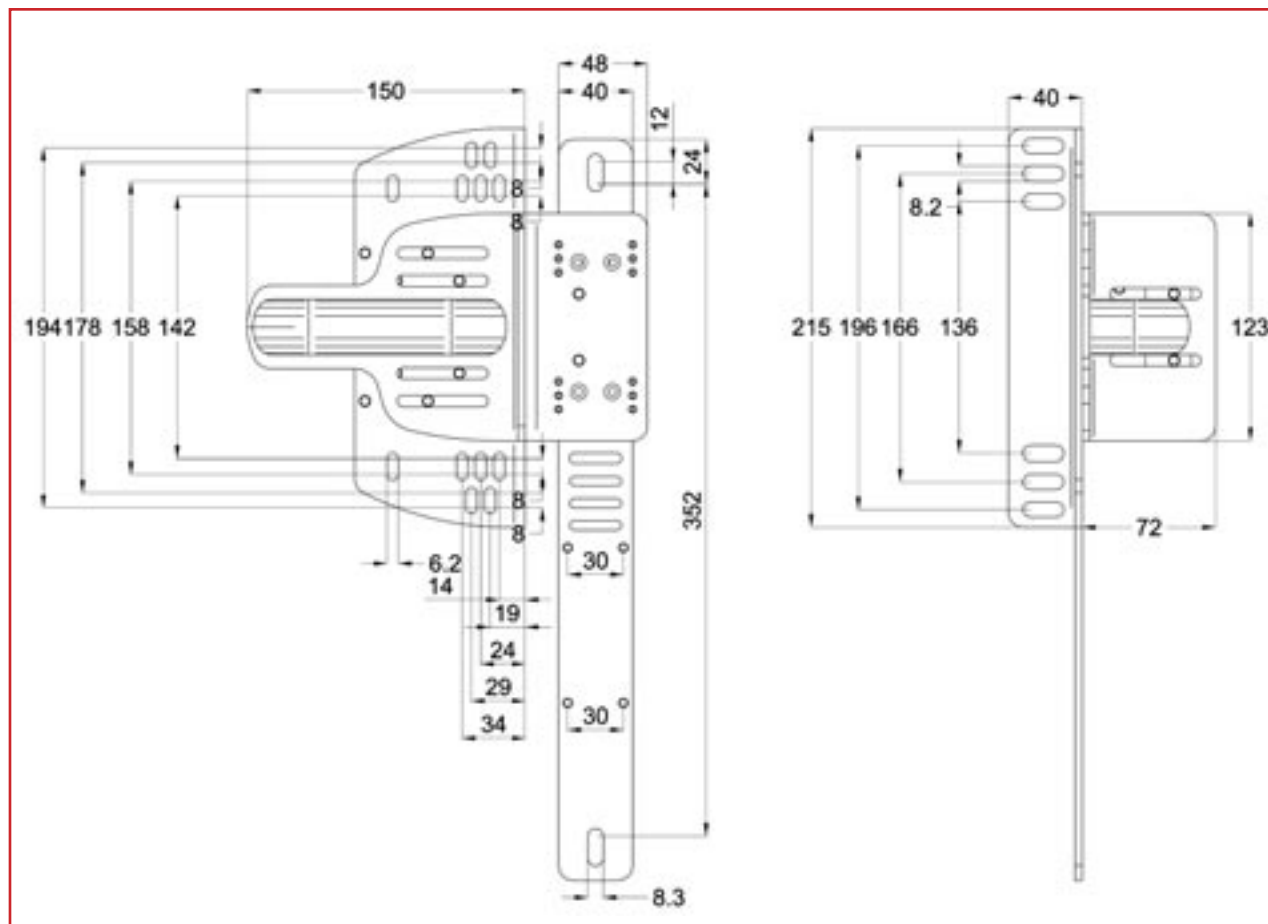
## Fincorsa elettromagnetico di interblocco - Serie FEP / Electromagnetic Interlocking limit switch - FEP Series

FEP-RFID - Versione con codifica RFID dell'attuatore  
 FEP-LED - Versione standard con segnalazione LED  
 FEP - Versione standard puramente elettromeccanica  
 Tutti i dispositivi sono disponibili in versione pre-cablata con connettore M12.  
 Il relativo azionatore è già incluso ordinando il kit completo MIH + FEP

FEP-RFID- RFID coded actuator version  
 FEP-LED- standard version with Led signalling  
 FEP- a totally electromagnetic standard version  
 All devices are available in pre-wired version with M12 connection  
 By ordering the Complete MIH+FEP kit, the actuator is included.

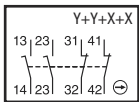


## MIH - Dimensions

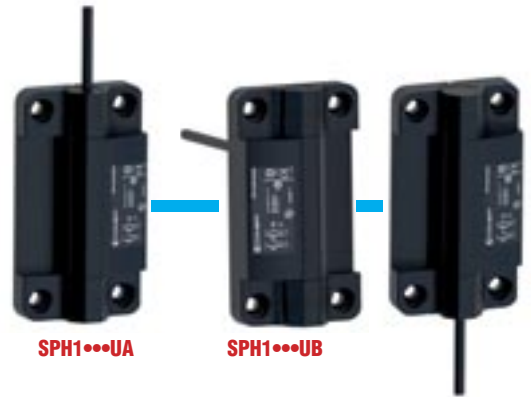
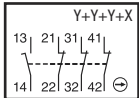


## Safety Hinges

**X22C:** Slow action  
break before make  
2NO+2NC



**X13C:** Slow action  
break before make  
1NO+3NC



SPH1...UA

SPH1...UB

SPH1...UC



SPH1...MA

SPH1...MC

## Complementary Mechanical hinges



SPH1-COMP1

SPH1-COMP2

### Contact blocks

**Type:** double break, electrically separated

**Approvals:** UL 508 / CSA C22-2 n. 14



## Safety hinges - Description

### Applications

Within the range of safety devices, Comepi has created a new hinge with multiple integrated circuit which can suit all applications where high security is combined with a modern and sophisticate design. Thanks to its small sizes and numerous mounting options and connection (cable/connectors), the device is easily installed on most common aluminium profiles (minimum width 30 mm.). Its installation is also facilitated by the integration of a safety switch integrated into a single body, thus avoiding the need to separately install a mechanical hinge and a safety switch connected via a special pin.

The use of stainless steel components and the degree of protection IP67 permit the hinge to be subjected to frequent washing and to be used in environments where cleanliness and hygiene require maximum attention. The Comepi hinge was developed and manufactured according to the rules set out in IEC international publications and to applicable EN European Standards; the use of a redundant system and a proper configuration allows to obtain a safety system of machinery up to SIL 3 or PLe according to EN ISO 13849-1.

### Description

Both the self-extinguishing body of the hinge and the rotation pin are made of technopolymer with high-rigidity capable of resisting to solvents, oils, greases and various chemical agents. The internal switch is composed of 4 slow action double break contacts. The positive opening (according to IEC EN 60947-5-1) is guaranteed on all NC contacts. All the circuits have a low contact resistance thanks to the self-cleaning action of the silver pastes.

Each hinge is supplied with the following kit:

- n°4 technopolymer covers (to avoid free access to screws);
- n°4 technopolymer bushings (for hexagon socket or nut M6).
- n°2 thermoplastic elastomer safety plugs to guarantee IP67 protection degree.


**Casing**

- Made of self-extinguishing technopolimer

**Mounting the casing**

- 4 x M6 screws UNI 5933 ISO 10642 countersunk-head screws
- 4 x cylindrical head screws with hexagon socket M6 UNI 5931 ISO 4762
- 4 x M6 UNI 5588 ISO 4032 nut

Screws and nuts are not supplied



**Electrical connection:**

- Cable 8x0,34 mm<sup>2</sup> PVC cable standard lengths: 2m and 5m
- M12 connector

**Contact Block:**

- Positive opening operation
- 2NO+2NC or 1NO+3NC slow action contacts
- Contacts are electrically separated

**Totally sealed for IP 67 protection degree**

**Symbols**

**Example:** S P H 1 X22C 020 U A

**Structure:** S P H 1        

**Contact block**

**X22C:** Slow action non-overlapping late make 2 NO + 2 NC contacts

**X13C:** Slow action non-overlapping late make 1 NO + 3 NC contacts

**Type of connection**

**020:** 2m UL PVC cable

**050:** 5m UL PVC cable

**Null:** Integrated M12 connector

**Output**

**A:** top axial

**B:** back

**C:** bottom axial

**Standard executions**

**U:** 8x0,34 mm<sup>2</sup> PVC cable

**M:** 8 poles M12 connector

Other versions of cable and electrical contacts are available on request: contact our sales department.



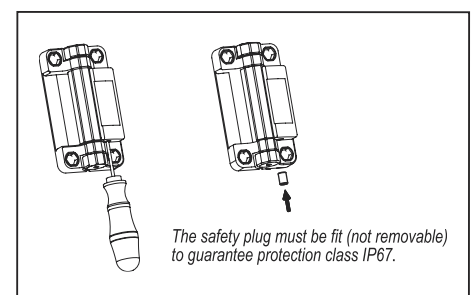
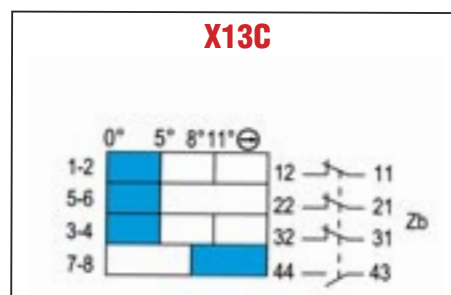
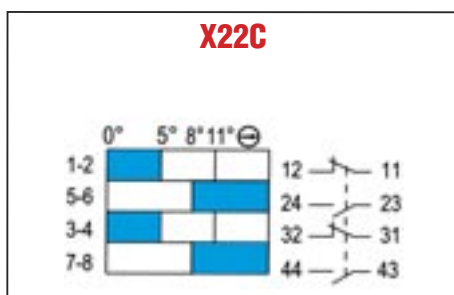
## Safety hinges - Technical Data

<b>SPH Series</b>	
<b>Standards</b>	IEC 60947-5-1, EN 60947-5-1 UNI EN ISO 14119
<b>Certifications - Approvals</b>	UL - IMQ - EAC - CCC
<b>Air temperature</b> near the device	
- during operation	°C
- for storage	°C
<b>Mounting positions</b>	All positions are authorised
<b>Protection against electrical shocks</b> (acc. to IEC 536)	Class II
<b>Degree of protection</b> (according to IEC 529 and EN 60 529)	IP 67

### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b> - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14		400 V (degree of pollution 3) (24 V for M12 connector) C 300, Q 300 (class II for M12 connector)
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (according to IEC 947-1 and EN 60 947-1)	kV	4 (2,5 for M12 connector)
<b>Conventional free air thermal current <math>I_{th}</math></b> (according to IEC 947-5-1) $\theta < 40$ °C	A	4 (2,5 for M12 connector)
<b>Short-circuit protection</b> <b><math>U_e &lt; 500</math> V a.c. - gG (gl) type fuses</b>	A	4
<b>Rated operational current</b> <b><math>I_e</math> / AC-15</b> (according to IEC 947-5-1)	24 V - 50/60 Hz A 120 V - 50/60 Hz A 250 V - 50/60 Hz A 400 V - 50/60 Hz A	4 4 4 4
<b><math>I_e</math> / DC-13</b> (according to IEC 947-5-1)	24 V - d.c. A 125 V - d.c. A 250 V - d.c. A	2 0.4 0.3
<b>Switching frequency</b>	Cycles/h	1200
<b>Mechanical durability</b> <b>B10d = 2.000.000 operations</b>		1 million of operations

### Operating diagrams



As shown in the travel diagrams, the angle of action is set at the factory to 5° (opening of the NC contacts, to be verified according to EN294).

This angle and consequently also angles relating to the closure of the NO contact and positive opening of the NC contacts can be adjusted by the installer; in the case of doors of considerable size, the operating angle can be reduced up to 1° operating with a screwdriver on the adjustment screw. The degree of protection IP67 is then secured by inserting the appropriate safety plug (not removable) in the adjustment hole.

It is recommended to verify the correct operation of the device before starting up the machine and we suggest to repeat the test periodically.

### Special executions on request

- Operating angle of the hinge other than from 0° to 180°, every 15°, where the system frame/door requires a special execution.
- NC and NO contact blocks setting (up to 4 NC).
- NO and NC overlapping contacts.



## Safety hinges - Technical Data

### Technical data approved by IMQ

<b>Standards</b>	Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards	
<b>Degree of protection</b>	IP 67	
<b>Rated insulation voltage <math>U_i</math></b>	400 V (degree of pollution 3)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	4 kV (2,5 kV for M12 connector)	
<b>Conventional free air thermal current <math>I_{th}</math></b>	4 A (2,5 A for M12 connector)	
<b>Short-circuit protection - gG type fuses</b>	4 A	
<b>Rated operational current <math>I_e</math> / AC-15</b>	24 V - 50/60 Hz	4 A
	120 V - 50/60 Hz	4 A
	250 V - 50/60 Hz	4 A
	400 V - 50/60 Hz	4 A
<b><math>I_e</math> / DC-13</b>	24 V - d.c.	2 A
	125 V - d.c.	0.4 A
	250 V - d.c.	0.3 A

### Technical data approved by UL

<b>Standards</b>	Devices conform with UL 508	
<b>Utilization categories</b>		
Cable "U-Type"	C300, Q300	
Connector / Cable+Connector "M-Type"	24 V / 2 A Class II	

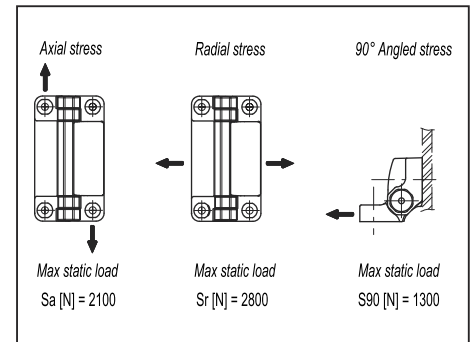
For the complete list of approved products, contact our technical department

## Implementation

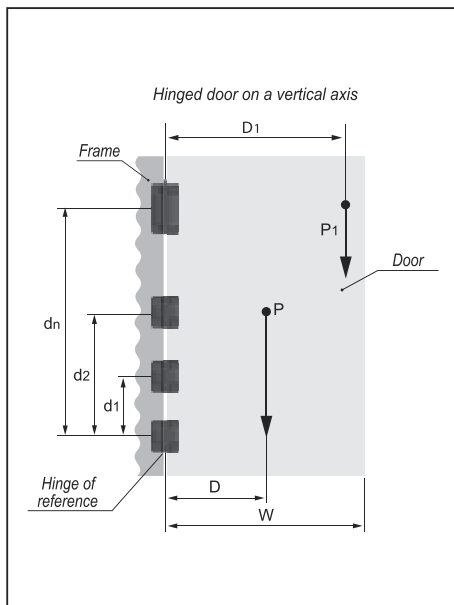
### Determination of maximum applicable load

For SPH1 hinges with built-in safety multiple switch, the reference value supplied is the max limit static load ( $S_a$ ,  $S_r$ ,  $S_{90}$ ), since these hinges can be used as safety devices.

Above this value, the material may break, thus prejudicing the hinge functionality. Obviously a suitable factor, according to the importance and safety level of the specific application, must be applied to this value. The load values shown in the tables of the different hinges are the result of tests carried out in our laboratories under controlled temperature and humidity (23°C-50% R.H.), under given conditions of use and for a limited period of time.



### Example of suitability check



- P** weight of the door [N]
- P1** additional extra load [N]
- W** width of the door
- D** distance [metres] between the centre of gravity of the door and the hinge axis. In normal conditions  $D = W/2$
- D1** distance [metres] between the hinge axis and the additional extra load application point
- N** number of hinges
- k** safety factor
- dT** sum of the distances [metres] of all the hinges from the hinge of reference ( $d = d + d + \dots + dn$ ). In case of only two hinge assembled,  $d$  is simply the distance between them

Conditions to be checked in order to ensure a correct functioning with two or more hinges

$$\frac{(P+P1)}{N} \cdot k < S_a$$

$$\frac{[(P \cdot D) + (P1 \cdot D1)]}{d_T} \cdot k < S_r$$

$$\frac{[(P \cdot D) + (P1 \cdot D1)]}{d_T} \cdot k < S_{90}$$

The technical designer must use suitable safety factors ( $k$ ) according to the type of application and function of the SPH1 hinge.

$$P = 294 \text{ N (30 Kg)} \quad D = 0,4 \text{ m} \quad N = 3$$

$$d_T = 1,5 \text{ m} \quad d_2 = 1 \text{ m} \quad d_1 = 0,5 \text{ m}$$

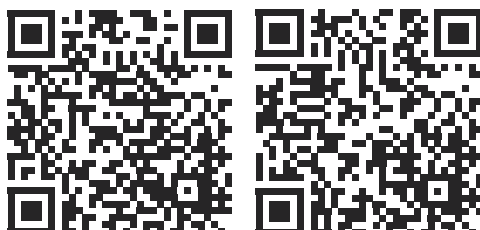
$$P_1 = 196 \text{ N (20 Kg)} \quad D_1 = 1,2 \text{ m}$$

$$\frac{490}{3} = 163,3 \cdot k < 2100$$

$$\frac{[(294 \cdot 0,4) + (196 \cdot 1,2)]}{1,5} = 235,2 \cdot k < 2800$$

$$\frac{[(294 \cdot 0,4) + (196 \cdot 1,2)]}{1,5} = 235,2 \cdot k < 1300$$

The examples shown here must be considered only as explanatory, since they are not applicable to all the different applications, conditions of use, ways of assembly which can actually take place. In practice, the technical designer, after applying a suitable safety factor ( $k$ ) must also test the chosen product to check its suitability.



**Download**  
Instruction sheet – Safety Hinges  
CE declaration

## Polymeric casing. IP67

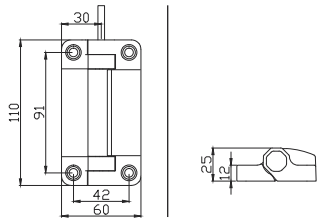
### Electrical connection:

Replace the symbol “●●●” with the length of the cable desired

**020:** Cable length 2m

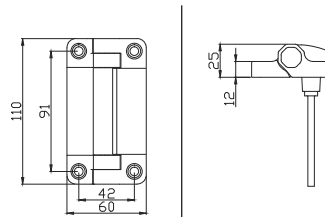
**050:** Cable length 5m

### Top axial exit with cable



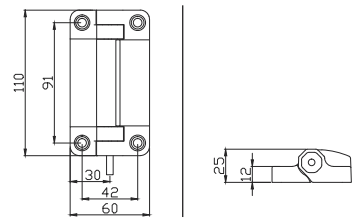
Min. actuating torque	0,5 Nm ⊖
Weight	280 g
Operating diagram	Page 30

### Back exit with cable



Min. actuating torque	0,5 Nm ⊖
Weight	280 g
Operating diagram	Page 30

### Bottom axial exit with cable



Min. actuating torque	0,5 Nm ⊖
Weight	280 g
Operating diagram	Page 30

### Contact Blocks

**X22C** (2NO+2NC)

SPH1X22C●●●UA

SPH1X22C●●●UB

SPH1X22C●●●UC

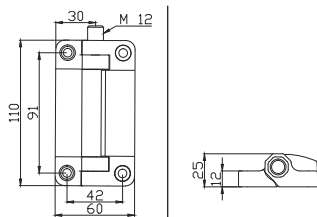
**X13C** (1NO+3NC)

SPH1X13C●●●UA

SPH1X13C●●●UB

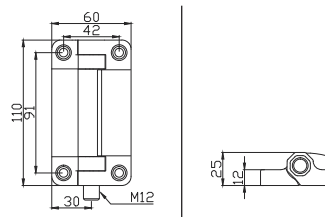
SPH1X13C●●●UC

### Top axial exit with M12 connector



Min. actuating torque	0,5 Nm ⊖
Weight	140 g
Operating diagram	Page 30

### Bottom axial exit with M12 connector



Min. actuating torque	0,5 Nm ⊖
Weight	140 g
Operating diagram	Page 30

### Contact Blocks

**X22C** (2NO+2NC)

SPH1X22CMA

SPH1X22CMC

**X13C** (1NO+3NC)

SPH1X13CMA

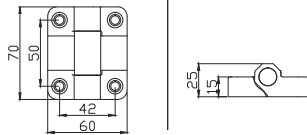
SPH1X13CMC

## Safety hinges - Accessories

### Complementary mechanical hinges

Glass-fibre reinforced technopolymer

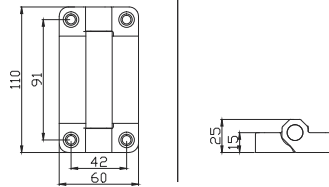
#### Complementary hinge 70 mm



Weight 85 g

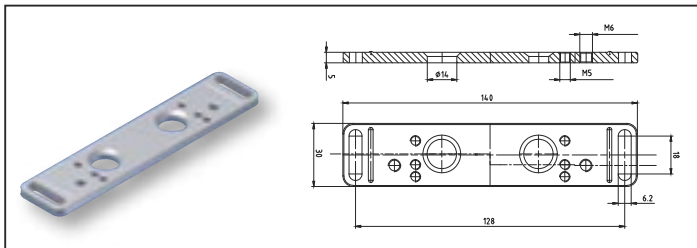
SPH1-COMP1

#### Complementary hinge 110 mm



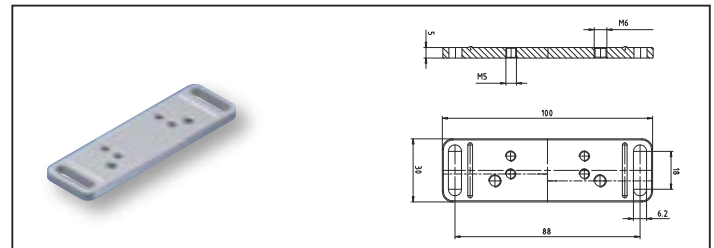
Weight 130 g

SPH1-COMP2



Art	Description
-----	-------------

SPH-FX1	Couple of supports for safety hinges SPH1 series (fixing screws for switch included)
---------	--------------------------------------------------------------------------------------



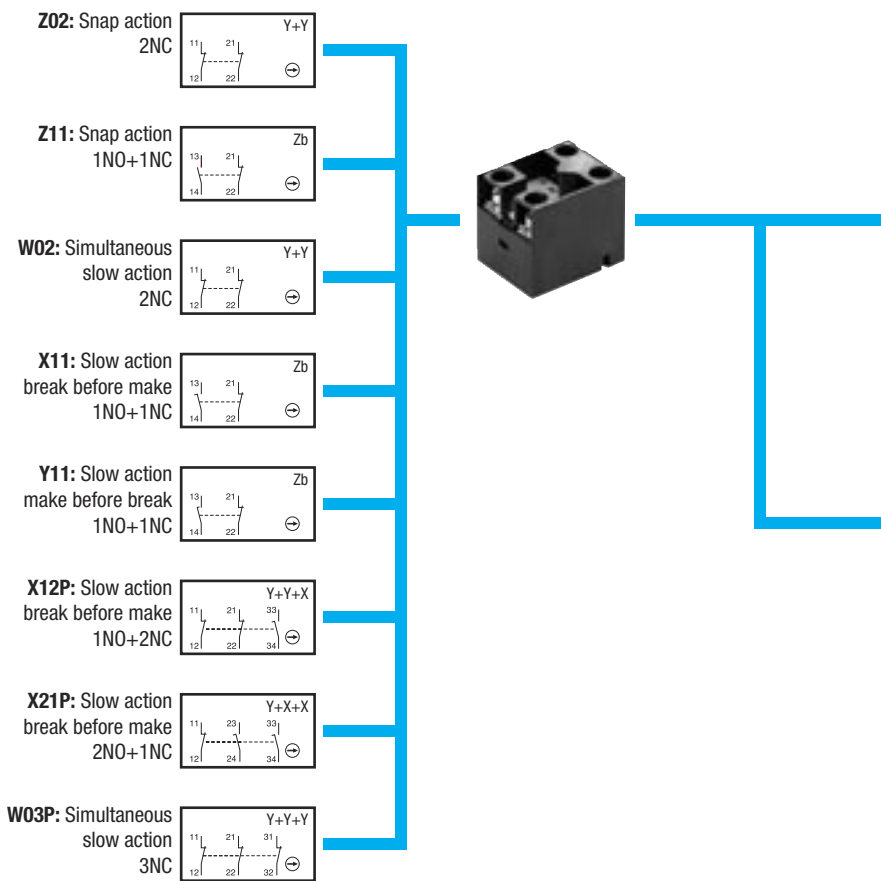
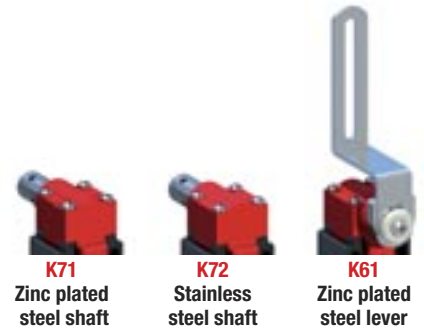
Art.	Description
------	-------------

SPH-FX2	Couple of supports for complementary hinges SPH1-COMP1 series (fixing screws for switch included)
---------	---------------------------------------------------------------------------------------------------



The mounting brackets are used in the presence of profiles with slots having a different pitch from the standard pitch of the hinge (40 mm).

## Hinge mount Safety Limit Switches



### Contact blocks

**Type:** double break, electrically separated

**Approvals:** UL 508 / CSA C22-2 n. 14



## Hinge mount Safety Limit Switches - Description

### Applications

Easy to use, the limit switches with rotative axis or lever offer specific qualities:

- Capability for strong current switching (conventional thermal current 10 A).
- Opening of the "N.C." contact(s) for a very small rotation angle: 12°.
- Contact blocks with dependent action and positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖ ).
- Electrically separated contacts.
- Precision on operating positions (consistency).
- Immunity to electromagnetic disturbances.

**These specific features make the limit switches ideal for monitoring and protection of light industrial machines without inertia equipped with angular movement protectors (doors, hinged grids, rotative covers or cases, etc.). Detection by the rotative axis or by means of a lever.**

- Opening of the mobile protector guarantees operator protection by immediately stopping the machine drive.
- These switches are suitable for conformity of the existing installed machine base, as they can be mounted on protection devices already installed.
- They comply with the requirements of European Directives (Low Voltage and Machines Directive) and are conform to European and international standards.

### Description

Safety limit switches of SP/SDP series are made of fibre-glass reinforced UL-V0 thermoplastic material, and they offer double insulation □ and a degree of protection IP65. Safety limit switches of SM/SDM series are made of zinc alloy (zamack) and have a degree of protection IP66. They are equipped with 1NO+1NC, 2NC, 1NO+2NC, 2NO+1NC or 3NC contact blocks with positive opening operation of the "N.C." contact(s).

**Casing**

- 30 mm. width with standardized dimensions acc. to EN 50047
- 50 mm. width with standardized dimensions

**Mounting the casing**

- 2 x M4 screws on top part for 30 mm. width
- 2 or 4 x M4 screws on top part for 50 mm. width

**Contact Block:**

- Positive opening operation
- Snap action or slow action
- Contacts are electrically separated

**Connecting terminals:**

- Block of 2 contacts: M3.5 (+, -) pozidriv 2 screw
- Block of 3 contacts: M3 (+, -) screw
- Screw head with captive cable clamp
- Markings conform with IEC 60947-1, IEC 60947-5-1 standard

**A variety of operating heads:**

- Zinc plated steel shaft
- Stainless steel shaft
- Zinc plated steel lever

**Cover:**

- 1 or 3 screws for 30 mm. casing
- 1 or 4 screws for 50 mm. casing

**Electrical connection:**

- 1 x cable gland for SP and SM series
- 2 x cable gland for SDP series
- 3 x cable gland for SDM series

### Symbols

Example: 

S	P	1	K	71	X	1	1
---	---	---	---	----	---	---	---

  
 Structure: 

			K				
--	--	--	---	--	--	--	--

**Casing width:**

**S** = 30 mm width + 1 cable inlet  
**SD** = 50 mm width + 2 cable inlets (SDP series) or 3 cable inlets (SDM series)

**P:** Plastic casing   **M:** Metal casing

**Electrical connection**

- 1:** cable inlets for PG13.5 cable gland
- 2:** cable inlets for 1/2 NPT cable gland \*
- 3:** cable inlets for PG11 cable gland
- 4:** cable inlets for M16 x 1,5 cable gland
- 5:** cable inlets for M20 x 1,5 cable gland
- 6:** M12 4 poles connector
- 7:** M12 5 poles connector
- 8:** M12 8 poles connector

**Operating heads:** codes 71-72-61

**Contact block**

- 11:** 1 NO + 1 NC contacts
- 02:** 2 NC contacts
- 12P:** 1 NO + 2 NC contacts
- 21P:** 2 NO + 1 NC contacts
- 03P:** 3 NC contacts

- Z:** Snap action
- W:** Slow action (contact dependent)
- X:** Slow action non-overlapping late make
- Y:** Slow action overlapping early make

\* In SP... and SDP... series, the 1/2" NPT thread is obtained by the use of a plastic adapter (delivered not mounted).

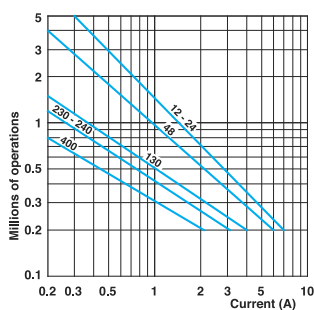
## Hinge mount Safety Limit Switches - Technical Data

	SP / SDP Series	SM / SDM Series
<b>Standards</b>	IEC 60947-5-1, EN 60947-5-1 UNI EN ISO 14119	
<b>Certifications - Approvals</b>	UL - CSA - IMQ - EAC - CCC	
<b>Air temperature</b> near the device		
– during operation	– 25 ... + 70	
– for storage	– 30 ... + 80	
<b>Mounting positions</b>	All positions are authorised	
<b>Protection against electrical shocks</b> (acc. to IEC 61140)	Class II	Class I
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	IP 65	IP 66

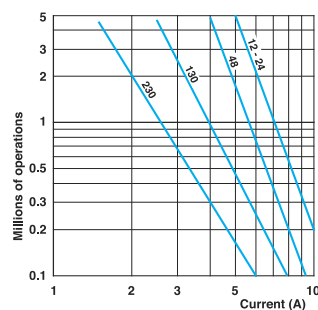
### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b> - according to IEC 60947-1 and EN 60947-1 - according to UL 508 and CSA C22-2 n° 14	500 V (degree of pollution 3) (400 V for contacts type Z02, X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for SM/SDM series and contacts type X12P, X21P, W03P)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (according to IEC 60947-1 and EN 60947-1)	kV	6
<b>Conventional free air thermal current <math>I_{th}</math></b> (according to IEC 60947-5-1) $\theta < 40$ °C	A	10
<b>Short-circuit protection</b> $U_e < 500$ V a.c. - gG (gl) type fuses	A	10
<b>Rated operational current</b> $I_e$ / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz A 120 V - 50/60 Hz A 400 V - 50/60 Hz A	10 6 4
$I_e$ / DC-13 (according to IEC 60947-5-1)	24 V - d.c. A 125 V - d.c. A 250 V - d.c. A	6 0.55 0.4
<b>Switching frequency</b>	Cycles/h	3600
<b>Load factor</b>		0.5
<b>Resistance between contacts</b>	m $\Omega$	25
<b>Connecting terminals</b>	M3.5 (+, -) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)	
<b>Terminal for protective conductor</b>	- M3.5 (+, -) pozidriv 2 screw with cable clamp	
<b>Connecting capacity</b>	1 or 2 x mm <sup>2</sup>	0.34 ... 2.5 (0.34... 1.5 for 3 poles contacts type)
<b>Terminal marking</b>	According to IEC 60947-5-1	
<b>Mechanical durability</b>	1 million of operations	
<b>Electrical durability</b> (according to IEC 60947-5-1)	Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)	
<b>B10d</b>	2 millions of operations	

AC-15 - Snap action



AC-15 - Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W



## Hinge mount Safety Limit Switches - Technical Data

### Technical data approved by IMQ

<b>Standards</b>	Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards	
<b>Degree of protection</b>	IP 65 (SP/SDP series) , IP 66 (SM/SDM series)	
<b>Rated insulation voltage <math>U_i</math></b>	500 V (degree of pollution 3) (400V for type Z02, X12P, X21P, W03P)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV	
<b>Conventional free air thermal current <math>I_{th}</math></b>	10 A	
<b>Short-circuit protection - gG (gl) type fuses</b>	10 A	
<b>Rated operational current</b>		
<b><math>I_e</math> / AC-15</b>	24 V - 50/60 Hz 400 V - 50/60 Hz	10 A 4 A
<b><math>I_e</math> / DC-13</b>	24 V - d.c. 125 V - d.c. 250 V - d.c.	6 A 0.55 A 0.4 A

### Technical data approved by UL

<b>Standards</b>	Devices conform with UL 508	
<b>Contact blocks type Z11, X11, Y11, W02 and Z02</b>	A600, Q600	
<b>Utilization categories</b>	(A300, Q300 when installed in SM/SDM series)	

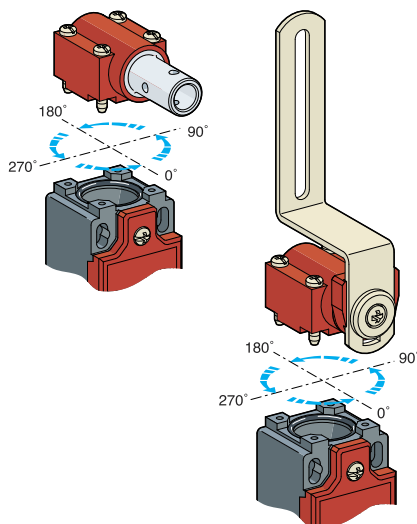
<b>Contact blocks type X12P, X21P and W03P</b>	A300, Q300	
<b>Utilization categories</b>	A300, Q300	
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.		

For the complete list of approved products, contact our technical department

## Implementation

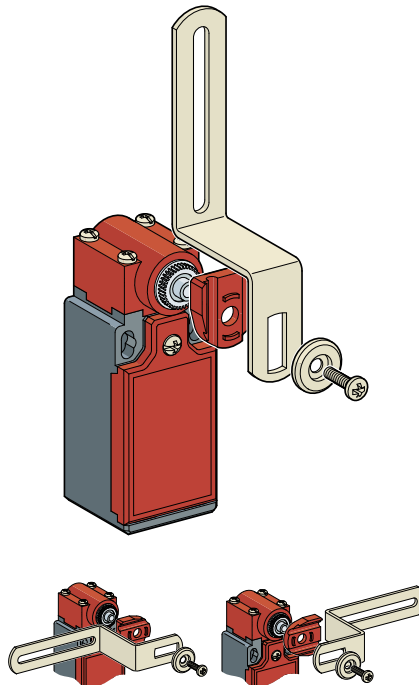
### Operating head orientation

The head can be rotated each 90°. Recommended tightening torque 0,5 Nm (max 0,8 Nm).



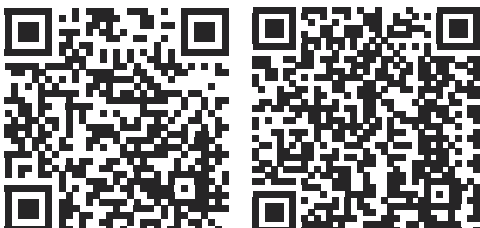
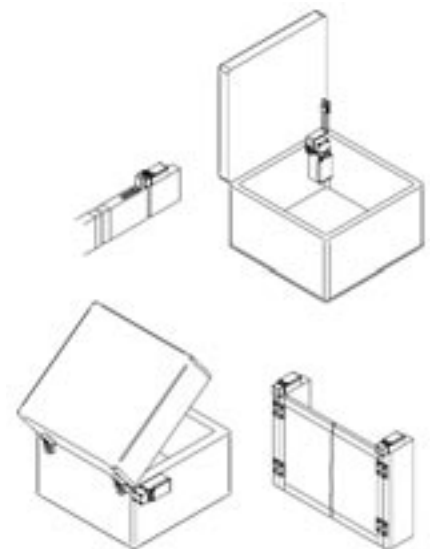
### Lever adjustment

The lever of the head model K61 can be adjusted every 10° in order to obtain the maximum flexibility on the working plan. Recommended tightening torque 0,5 Nm (max 0,8 Nm).



### Application

Monitoring of safety gates in machinery without inertia.



### Download

Instruction sheet – Hinge mounting safety limit switches  
CE declaration

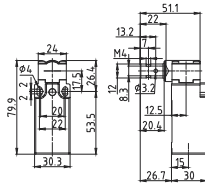
## Polymeric casing - IP65

### Electrical connection:

Replace the symbol “●” with the number of the thread desired

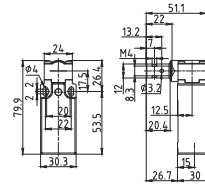
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 6: M12 4 poles connector
- 7: M12 5 poles connector
- 8: M12 8 poles connector

### K71 Zinc plated steel shaft



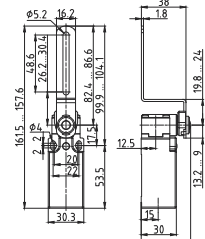
Min. actuating torque	0,12 Nm (0,60 Nm ☺)
Weight	90 g
Operating diagram	Page 71

### K72 Stainless steel shaft



Min. actuating torque	0,12 Nm (0,60 Nm ☺)
Weight	90 g
Operating diagram	Page 71

### K61 Zinc plated steel lever



Min. actuating torque	0,12 Nm (0,60 Nm ☺)
Weight	110 g
Operating diagram	Page 71

### Contact Blocks

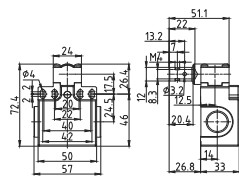
Contact Block	K71 Zinc plated steel shaft	K72 Stainless steel shaft	K61 Zinc plated steel lever
Z11 (1NO+1NC)	SP•K71Z11	SP•K72Z11	SP•K61Z11
X11 (1NO+1NC)	SP•K71X11	SP•K72X11	SP•K61X11
Y11 (1NO+1NC)	SP•K71Y11	SP•K72Y11	SP•K61Y11
W02 (2NC)	SP•K71W02	SP•K72W02	SP•K61W02
Z02 (2NC)	SP•K71Z02	SP•K72Z02	SP•K61Z02
X12P (1NO+2NC)	SP•K71X12P	SP•K72X12P	SP•K61X12P
X21P (2NO+1NC)	SP•K71X21P	SP•K72X21P	SP•K61X21P
W03P (3NC)	SP•K71W03P	SP•K72W03P	SP•K61W03P

### Electrical connection:

Replace the symbol “●” with the number of the thread desired

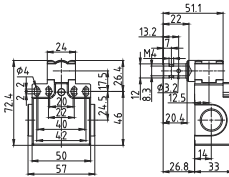
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

### K71 Zinc plated steel shaft



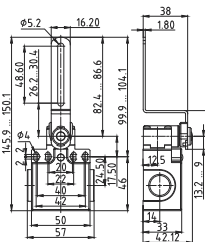
Min. actuating torque	0,12 Nm (0,60 Nm ☺)
Weight	120 g
Operating diagram	Page 71

### K72 Stainless steel shaft



Min. actuating torque	0,12 Nm (0,60 Nm ☺)
Weight	120 g
Operating diagram	Page 71

### K61 Zinc plated steel lever



Min. actuating torque	0,12 Nm (0,60 Nm ☺)
Weight	140 g
Operating diagram	Page 71

### Contact Blocks

Contact Block	K71 Zinc plated steel shaft	K72 Stainless steel shaft	K61 Zinc plated steel lever
Z11 (1NO+1NC)	SDP•K71Z11	SDP•K72Z11	SDP•K61Z11
X11 (1NO+1NC)	SDP•K71X11	SDP•K72X11	SDP•K61X11
Y11 (1NO+1NC)	SDP•K71Y11	SDP•K72Y11	SDP•K61Y11
W02 (2NC)	SDP•K71W02	SDP•K72W02	SDP•K61W02
Z02 (2NC)	SDP•K71Z02	SDP•K72Z02	SDP•K61Z02
X12P (1NO+2NC)	SDP•K71X12P	SDP•K72X12P	SDP•K61X12P
X21P (2NO+1NC)	SDP•K71X21P	SDP•K72X21P	SDP•K61X21P
W03P (3NC)	SDP•K71W03P	SDP•K72W03P	SDP•K61W03P

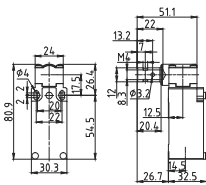
## Metal casing - IP66

### Electrical connection:

Replace the symbol "•" with the number of the thread desired

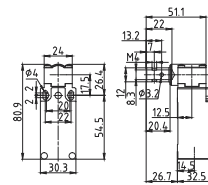
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 7: M12 5 poles connector
- 8: M12 8 poles connector

### K71 Zinc plated steel shaft



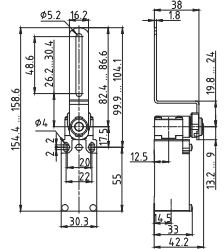
Min. actuating torque **0,12 Nm (0,60 Nm ☺)**  
 Weight **185 g**  
 Operating diagram **Page 71**

### K72 Stainless steel shaft



Min. actuating torque **0,12 Nm (0,60 Nm ☺)**  
 Weight **185 g**  
 Operating diagram **Page 71**

### K61 Zinc plated steel lever



Min. actuating torque **0,12 Nm (0,60 Nm ☺)**  
 Weight **205 g**  
 Operating diagram **Page 71**

### Contact Blocks

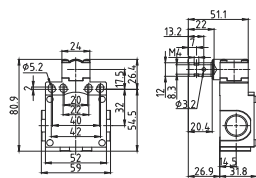
Z11 (1NO+1NC)	SM•K71Z11	SM•K72Z11	SM•K61Z11
X11 (1NO+1NC)	SM•K71X11	SM•K72X11	SM•K61X11
Y11 (1NO+1NC)	SM•K71Y11	SM•K72Y11	SM•K61Y11
W02 (2NC)	SM•K71W02	SM•K72W02	SM•K61W02
Z02 (2NC)	SM•K71Z02	SM•K72Z02	SM•K61Z02
X12P (1NO+2NC)	SM•K71X12P	SM•K72X12P	SM•K61X12P
X21P (2NO+1NC)	SM•K71X21P	SM•K72X21P	SM•K61X21P
W03P (3NC)	SM•K71W03P	SM•K72W03P	SM•K61W03P

### Electrical connection:

Replace the symbol "•" with the number of the thread desired

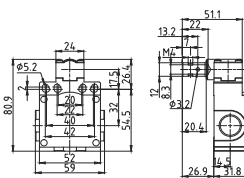
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

### K71 Zinc plated steel shaft



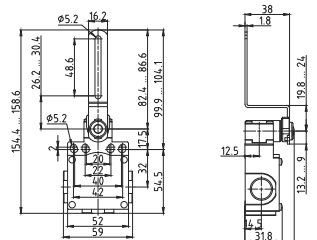
Min. actuating torque **0,12 Nm (0,60 Nm ☺)**  
 Weight **245 g**  
 Operating diagram **Page 71**

### K72 Stainless steel shaft



Min. actuating torque **0,12 Nm (0,60 Nm ☺)**  
 Weight **245 g**  
 Operating diagram **Page 71**

### K61 Zinc plated steel lever



Min. actuating torque **0,12 Nm (0,60 Nm ☺)**  
 Weight **265 g**  
 Operating diagram **Page 71**

### Contact Blocks

Z11 (1NO+1NC)	SDM•K71Z11	SDM•K72Z11	SDM•K61Z11
X11 (1NO+1NC)	SDM•K71X11	SDM•K72X11	SDM•K61X11
Y11 (1NO+1NC)	SDM•K71Y11	SDM•K72Y11	SDM•K61Y11
W02 (2NC)	SDM•K71W02	SDM•K72W02	SDM•K61W02
Z02 (2NC)	SDM•K71Z02	SDM•K72Z02	SDM•K61Z02
X12P (1NO+2NC)	SDM•K71X12P	SDM•K72X12P	SDM•K61X12P
X21P (2NO+1NC)	SDM•K71X21P	SDM•K72X21P	SDM•K61X21P
W03P (3NC)	SDM•K71W03P	SDM•K72W03P	SDM•K61W03P

## 7 mm Safety Magnetic Sensors

Approvals: UL 508 / EN 60947-5-1



### Safety Magnetic Target - SMP1 series

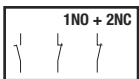
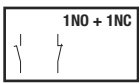
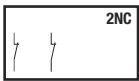


Actuation distance 5 mm

SMP1AMG

### Safety Magnetic Sensors

#### Contacts



SMP1A...



SMP1A...K



SMP1A...001M



SMP1A...L



SMP1A...KL



SMP1A...001ML

### Safety Magnetic Target - SMP2 series



Actuation distance 5 mm

SMP2AMG

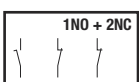
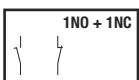
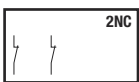


Actuation distance 8 mm

SMP2BMG

### Safety Magnetic Sensors

#### Contacts



SMP2A...



SMP2A...K



SMP2A...001M



SMP2A...L



SMP2A...KL



SMP2A...001ML

\*Only on selected models, contact the Comepi customer service for more information

## Safety Magnetic Sensors - Description

### Applications

Comepi offers a range of safety magnetic sensors SMP series designed to satisfy applications requiring high safety standards. Combined with an appropriate safety module, SMP magnetic sensors guarantee a safety system with Safety Integrity Level (SIL CL) up to SIL 3 (according to EN 62061) and Performance Level up to PLe (according to EN ISO 13849-1).

- Sealed: immune to dirt
- Wide actuation zone
- Difficult to by-pass as they can be easily hidden (with non-magnetic material)
- Electrical output contacts: 2NC, 1NO + 1NC or 1NO + 2NC
- Optionally provided with LED indicator
- Intervention from all directions

They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

### Description

The housing is made of technopolymer and it offers a degree of protection IP67. Integrated cable or M8 / M12 connection allow to install these devices in the most varied applications.

**Housing**

- 36 mm. width
- 88 mm. width

**Housing fixing**

- 2 x M4 screws

**Output contacts:**

- 2NC, 1NO + 2NC, 1NO + 1NC contacts

**LED indicator**

- Optionally provided on all models

**Electrical connection:**

- PVC cable
- M8 integrated connector (only for 2NC and 1NO + 1NC contacts)
- PVC cable + M12 connector

**Symbols**

**Housing dimensions**  
**1A:** 36 x 26 x 13 mm.  
**2A:** 88 x 25 x 13 mm.

**Contacts (with closed protection)**  
**02:** 2NC contacts  
**12:** 1NO + 2NC contacts  
**11:** 1NO + 1NC contacts

**Example:**

SMP	1A	11	S	010		
-----	----	----	---	-----	--	--

**Structure:**

SMP						
-----	--	--	--	--	--	--

**Direction of the Output Connection**  
**Null:** Right  
**L:** Left

**Connection type**  
**Null:** PVC cable  
**K:** M8 integrated connector  
**M:** M12 connector

**Cable length**  
**010:** 1 m. PVC cable  
**020:** 2 m. PVC cable  
**001:** 10 cm. PVC cable (M12 + cable version only)  
**Null:** Connector

**Version**  
**S:** Standard  
**L:** With LED indicator

## Safety Magnetic Sensors - Technical Data

		SMP Series
<b>Temperature range</b>		
– Operation	°C	– 25 ... + 80
– Storage	°C	– 25 ... + 80
<b>Mounting positions</b>		All positions are authorised
<b>Degree of protection</b> (according to IEC 60529 and EN 60 529)		IP 67
<b>Pollution degree</b> (according to IEC 60947-5-1)		3
<b>Sil level</b> (Sil CL) (according to EN IEC 62061)		Up to Sil 3 (*)
<b>Performance level</b> (PL) (according to EN ISO 13849-1)		Up to PLe (*)
<b>Safety category</b> (according to EN ISO 13849-1)		Up to Cat 4 (*)
<b>B10d for each channel</b>		20.000.000 (*) / 400.000 (used with max load: 24V - 0,25A)

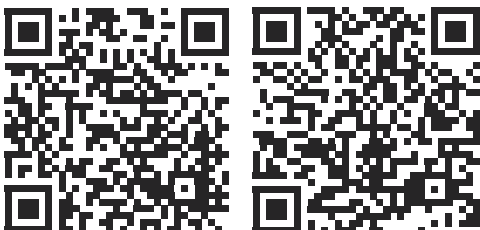
(\*) Connecting a single sensor to a COMEPI safety module MS1A31...\*

### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b> according to IEC 60947-1 and EN 60947-1		120 Vac (cable connection and cable +M12 4 poles connector) 60 Vac / 75 Vdc (M8 connector) 30 Vac / 36 Vdc (M12 8 poles connector)
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	kV	6 (1,5 for M8 or M12 connectors)
<b>Conventional free air thermal current <math>I_{th}</math></b> (according to IEC 60947-5-1) $\theta < 40$ °C	A	0,25
<b>Rated voltage / current</b>		24 Vac / dc - 0,25 A (resistive load)
<b>Max resistive load</b>	W	6 (external fuse 0,25 A type F)
<b>Electrical durability</b>		1.000.000 operations

### Approvals

<b>Standards</b>	EN 60947-1, EN 60947-5-1, EN 60947-5-2, EN 60947-5-3 (*), EN ISO 14119, EN ISO 12100-1, EN ISO 12100-2, EN ISO 13849-1, EN ISO 13849-2, EN 60204-1, EN 60529
<b>Directives</b>	2014/35/UE low voltage 2006/42/CE machinery 2014/30/UE electromagnetic
<b>Certifications</b>	CE



#### Download

Instruction sheet – Safety magnetic sensor  
CE declaration

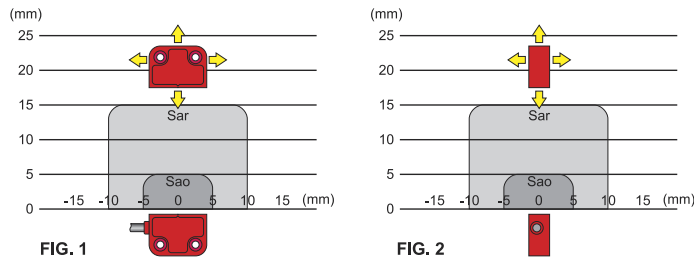


## Safety Magnetic Sensors - Technical Data

### Implementation

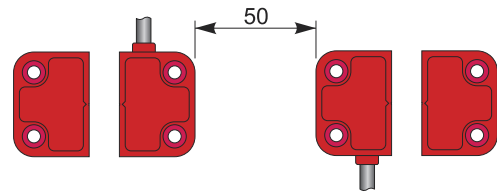
#### SMP1AMG

##### Switching distance



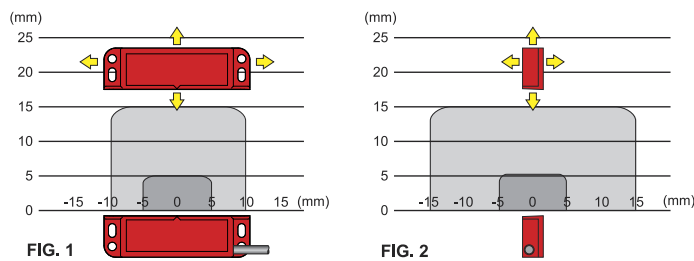
N.B. : The activation areas shown in Fig.1 and Fig. 2 are indicative.

##### Minimum distance between sensors



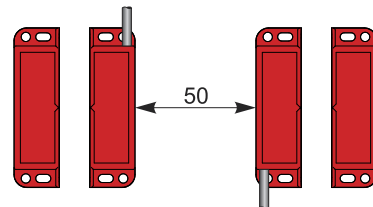
#### SMP2AMG

##### Switching distance



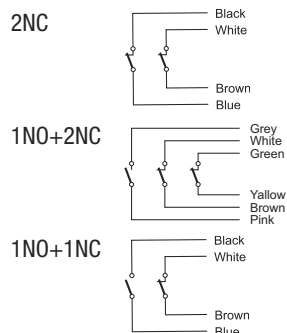
N.B. : The activation areas shown in Fig.1 and Fig. 2 are indicative.

##### Minimum distance between sensors

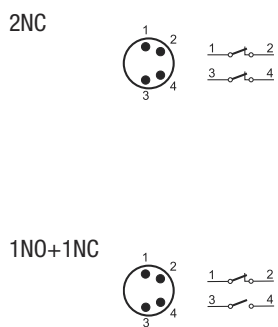


### Electrical connections

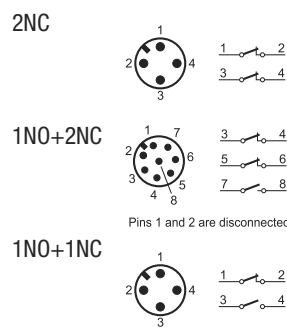
#### Cable connections



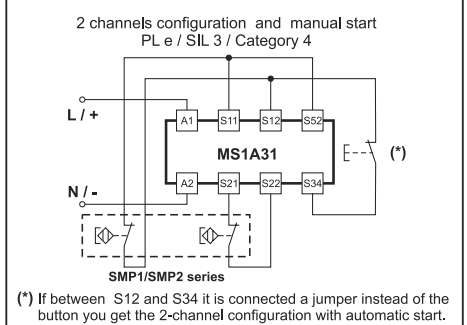
#### M8 connections



#### Cable + M12 connections



#### Example of connection with safety module



### Operating features

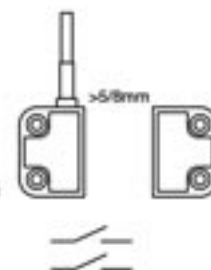
#### GATE CLOSED

operating condition  
ES. 2NC  
LED ON



#### GATE OPEN

operating condition  
ES. 2NC  
LED OFF



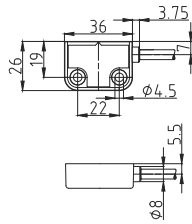
## SMP1 - Polymeric housing - IP67

### Safety Magnetic Target SMP1AMG

Actuation distance: 5 mm.

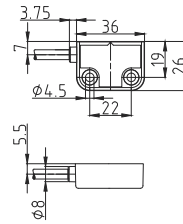


### Cable connection



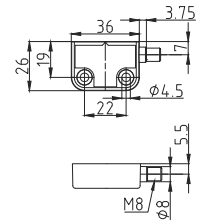
Weight 75 g  
Operating diagram Page 43

### Cable connection



Weight 75 g  
Operating diagram Page 43

### M8 integrated connector



Weight 35 g  
Operating diagram Page 43

### Contact Blocks

2NC	SMP1A02S●●●	SMP1A02S●●●L	SMP1A02SK
1NO + 2NC	SMP1A12S●●●	SMP1A12S●●●L	
1NO + 1NC	SMP1A11S●●●	SMP1A11S●●●L	SMP1A11SK
2NC with LED signalling	SMP1A02L●●●	SMP1A02L●●●L	SMP1A02LK
1NO + 2NC with LED signalling	SMP1A12L●●●	SMP1A12L●●●L	
1NO + 1NC with LED signalling	SMP1A11L●●●	SMP1A11L●●●L	SMP1A11LK

### Electrical connection:

Replace the symbol "●●●" with the length of the cable desired

010: Cable length 1m

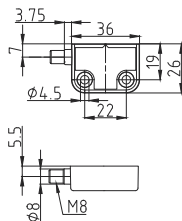
020: Cable length 2m

### Safety Magnetic Target SMP1AMG

Actuation distance: 5 mm.

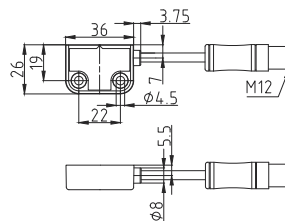


### M8 integrated connector



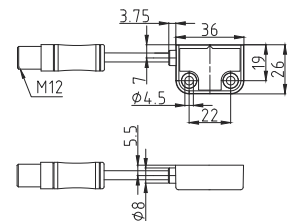
Weight 35 g  
Operating diagram Page 43

### M12 connector



Weight 50 g  
Operating diagram Page 43

### M12 connector



Weight 50 g  
Operating diagram Page 43

### Contact Blocks

2NC	SMP1A02SKL	SMP1A02S001M	SMP1A02S001ML
1NO + 2NC		SMP1A12S001M	SMP1A12S001ML
1NO + 1NC	SMP1A11SKL	SMP1A11S001M	SMP1A11S001ML
2NC with LED signalling	SMP1A02LKL	SMP1A02L001M	SMP1A02L001ML
1NO + 2NC with LED signalling		SMP1A12L001M	SMP1A12L001ML
1NO + 1NC with LED signalling	SMP1A11LKL	SMP1A11L001M	SMP1A11L001ML

## SMP2- Polymeric housing - IP67 □

### Safety Magnetic Target SMP2AMG

Actuation distance: 5 mm.

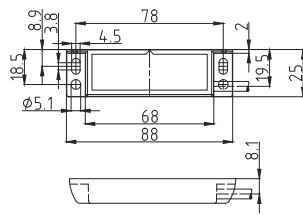


### Safety Magnetic Target SMP2BMG

Actuation distance: 8 mm.

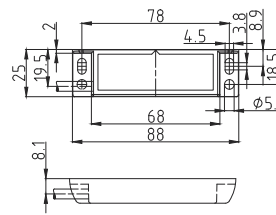


Cable connection



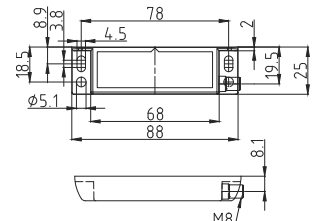
Weight 90 g  
Operating diagram Page 43

Cable connection



Weight 90 g  
Operating diagram Page 43

M8 integrated connector



Weight 55 g  
Operating diagram Page 43

#### Contact Blocks

2NC	SMP2A02S●●●	SMP2A02S●●●L	SMP2A02SK
1NO + 2NC	SMP2A12S●●●	SMP2A12S●●●L	
1NO + 1NC	SMP2A11S●●●	SMP2A11S●●●L	SMP2A11SK
2NC with LED signalling	SMP2A02L●●●	SMP2A02L●●●L	SMP2A02LK
1NO + 2NC with LED signalling	SMP2A12L●●●	SMP2A12L●●●L	
1NO + 1NC with LED signalling	SMP2A11L●●●	SMP2A11L●●●L	SMP2A11LK

#### Electrical connection:

Replace the symbol "●●●" with the length of the cable desired

010: Cable length 1m

020: Cable length 2m

### Safety Magnetic Target SMP2AMG

Actuation distance: 5 mm.

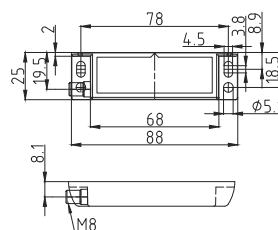


### Safety Magnetic Target SMP2BMG

Actuation distance: 8 mm.

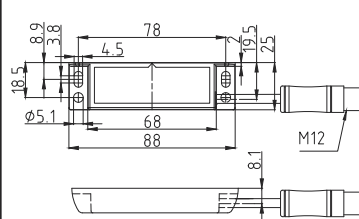


M8 integrated connector



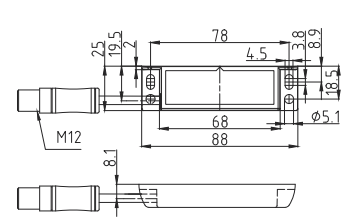
Weight 55 g  
Operating diagram Page 43

M12 connector



Weight 70 g  
Operating diagram Page 43

M12 connector



Weight 70 g  
Operating diagram Page 43

#### Contact Blocks

2NC	SMP2A02SKL	SMP2A02S001M	SMP2A02S001ML
1NO + 2NC		SMP2A12S001M	SMP2A12S001ML
1NO + 1NC	SMP2A11SKL	SMP2A11S001M	SMP2A11S001ML
2NC with LED signalling	SMP2A02LKL	SMP2A02L001M	SMP2A02L001ML
1NO + 2NC with LED signalling		SMP2A12L001M	SMP2A12L001ML
1NO + 1NC with LED signalling	SMP2A11LKL	SMP2A11L001M	SMP2A11L001ML

## Multifunction Safety modules

### Applications

Multifunction safety modules are able to monitor multiple safety functions of industrial machinery, protecting operators from dangerous moving parts of the machine. The COMETPI modules provide a safety-related interruption of a safety circuit. These devices are compliant with the requirements of EN ISO 13849-1, EN 61508, EN62061 and may be used in applications with E-Stops, E-Gates, limit switches, non-contact switches, safety light curtains (ESPE Type4 and Type 2), safety light beams (single beam) and safety mats.

### Main Features

COMETPI provides up to 4 Output Signal Switching Devices. The correct opening and closing of the safety function OSSDs is tested automatically.

All the modules provide at least 1 auxiliary output.

MS2A22-024 model output actuation delay, can be easily set via the hex-switch, selected from a choice of 15 pre-defined configurations, from 0 to 30 sec.

MT2A22-024 include 2 delayed digital outputs and two instantaneous digital outputs.

4 LEDs on the front panel indicate the status and any possible errors during operation.


**Casing**

- Technopolymer IP5X
- Standard dimension 18 x 90 mm.


**DIN rail mounting**

**Output contacts**

- 2NO + 2NO delayed (MT2A22-024)
- 4NO (MS2A40-024)
- 3NO + 1NC AUX (MS2A31-024)



**Approvals: UL 508 / EN 60947-5-1**



**Types Certificate Number:**  
4420515176917

**LED indicators for status, supply and diagnostic**

- Power
- Input 1
- Input 2
- Channels

**Electrical connection:**

- IP20 terminal blocks
- 1 or 2 x 0,75... 1,5 mm<sup>2</sup>

**Symbols**

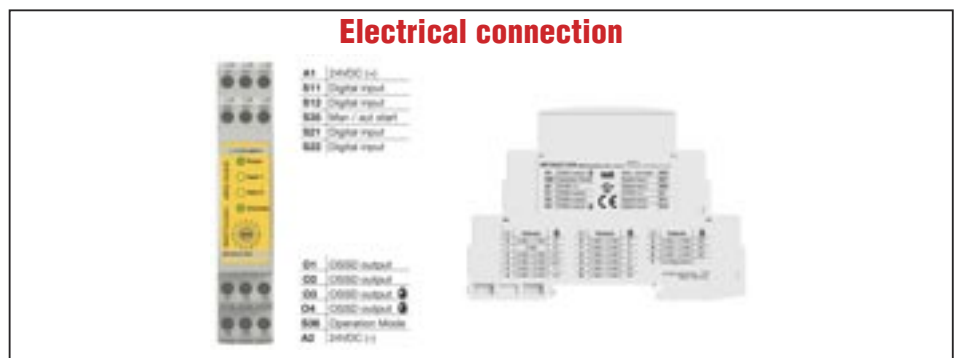
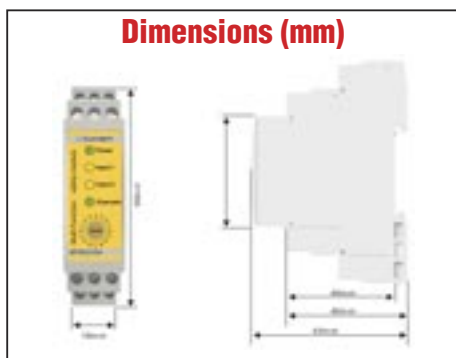
Example: 

MT2A22	-	024
--------	---	-----

Structure: 

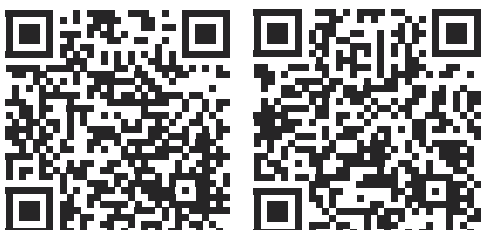
M.....	-	
--------	---	--

**Tensione di alimentazione:**  
024: 24V AC/DC



## Multifunction Safety modules - Technical Data

<b>MS2-MT2 Series</b>	
<b>Standards</b>	EN60947-1, EN60947-5-1, EN61000-6-2, EN61000-4, EN61326-3-1, EN60204-1, EN ISO 13849-1, EN ISO 12100-1, EN ISO 12100-2, EN62061, EN1037, EN60664-1, EN60529
<b>Directives</b>	2014/35/UE low voltage 2006/42/CE machinery 2014/30/UE electromagnetic CE - ROHS - UL - TUV
<b>Certifications - Approvals</b>	Class II
<b>Air temperature</b> near the device	
– during operation	°C 0 ... + 55
– for storage	°C – 25 ... + 55
<b>Protection against electrical shocks</b> (acc. to IEC 60536)	Class II
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	Casing IP5X - Terminal blocks IP20
<b>Pollution degree</b>	3 external, 2 internal
<b>Safety integrity level</b> (SIL CL) (according to IEC 61508, IEC 62061)	Up to SIL 3
<b>Performance level</b> (PL) (according to EN ISO 13849-1)	Up to PLe
<b>Safety category</b> (according to EN ISO 13849-1)	Up to Cat 4
<b>Mechanical durability</b>	10 millions of operations
<b>Electrical durability</b>	100.000 operations
<b>MTTFd</b>	2403 a (55 °C) / 1268 a (65 °C)
<b>Diagnostic coverage</b>	H
<b>PFHd</b>	1,89 E <sup>-9</sup> (55 °C) / 3,58 E <sup>-9</sup> (65 °C)
<b>Electrical Data</b>	
<b>Rated insulation voltage <math>U_i</math></b> (acc. to IEC/EN 60947-1)	250 V (degree of pollution 3)
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (acc. to IEC/EN 60947-1)	4 kV
<b>Power supply</b>	
Rated operating voltage $U_N$ ( $\pm 15\%$ )	24 Vdc (10% max residual ripple in DC)
Rated power consumption	max current $\leq 400$ mA - max drop voltage $\leq 2$ V
<b>Control circuit</b>	
Protection against short circuits	Resistance PTC with intervention operating time $> 100$ ms, reset time $> 3$ s - $I_h = 0,5A$
Input max resistance	50 $\Omega$
Input max current	30mA
<b>Output circuit</b>	
Utilization categories (according to EN 60947-1)	DC 13, $U_e = 24$ V, $I_e = 6$ A (6 oper/minute)
Max switching voltage	300 Vdc
Switching current range (per contact)	min 10 mA - max 6A (external protection fuse 6A F type)
Conventional free air thermal current $I_{th}$	6A (max current sum: 64A <sup>2</sup> )
Max contact resistance	100 m $\Omega$



**Download**

Instruction sheet – OSSD safety modules MT2, MS2, MS3  
CE declaration

## Electromechanical Safety modules

### Applications

Safety devices MS series are modules for emergency stop which have been developed for safety applications up to SIL 3 (EN 62061) and up to PLE (EN ISO 13849-1). They are suitable for the control of limit switches for safety gates and of safety magnetic sensors.

- 1 or 2 channels input
- Manual / Automatic Start
- Electromechanical outputs with safety relays
- 3NO safety contacts + 1NC contact for signalling
- Suitable for use with electromechanic devices (limit switches and safety sensors) and with optical barriers

They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

### Description

The polymeric housing for DIN rail mounting has a degree of protection IP40 (IP20 on terminal blocks) and it has standard dimensions 22.5 x 114 mm.

**Casing**

- Technopolymer IP40 (IP20 on terminal blocks)
- Standard dimension 22,5 x 114 mm.

**Output contacts**

- 3NO safety contacts +1NC signalling contact

**DIN rail mounting**

**Electrical connection:**

- IP20 terminal blocks
- 1 or 2 x 0,75... 1,5 mm<sup>2</sup>

**LED indicators for status, supply and diagnostic**

- Power
- Channel 1
- Channel 2

**Symbols**

Example: 

MS1A31	–	024
--------	---	-----

Structure: 

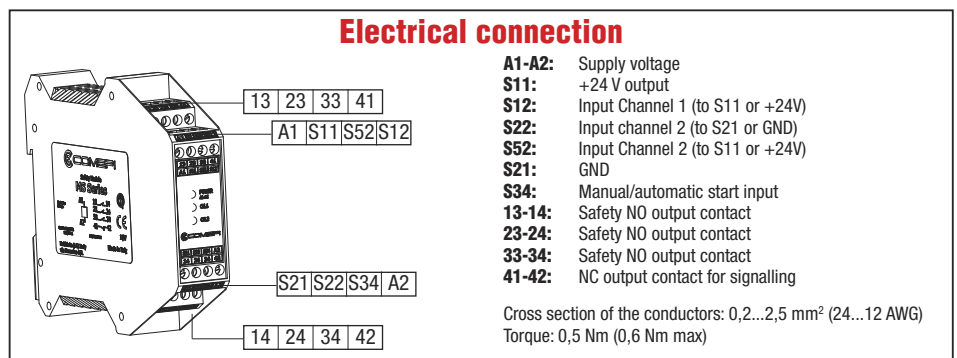
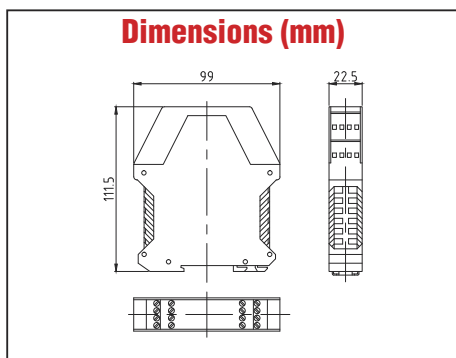
MS1A31	–	
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**Tensione di alimentazione:**

**024:** 24V AC/DC

**120:** 120V AC

**230:** 230V AC



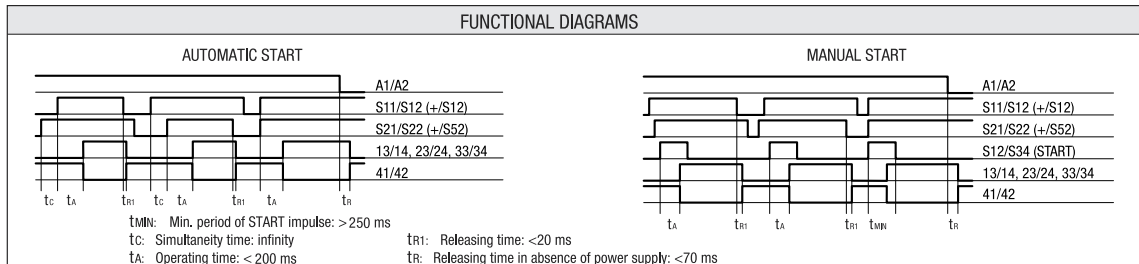


## Electromechanical Safety modules

<b>MS1 Series</b>	
<b>Standards</b>	EN60947-1, EN60947-5-1, EN61000-6-2, EN61000-4, EN61326-3-1, EN60204-1, EN ISO 13849-1, EN ISO 12100-1, EN ISO 12100-2, EN62061, EN1037, EN60664-1, EN60529
<b>Directives</b>	2014/35/UE low voltage 2006/42/CE machinery 2014/30/UE electromagnetic
<b>Certifications - Approvals</b>	CE - IMQ
<b>Air temperature</b> near the device	
– during operation	°C – 25 ... + 55
– for storage	°C – 25 ... + 55
<b>Protection against electrical shocks</b> (acc. to IEC 60536)	Class II
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	Casing IP40 - Terminal blocks IP20
<b>Pollution degree</b>	3 external, 2 internal
<b>Safety integrity level</b> (Sil CL) (according to EN IEC 62061)	Up to Sil 3
<b>Performance level</b> (PL) (according to EN ISO 13849-1)	Up to PL <sub>e</sub>
<b>Safety category</b> (according to EN ISO 13849-1)	Up to Cat 4
<b>Mechanical durability</b>	10 millions of operations
<b>Electrical durability</b>	100.000 operations
<b>MTTFd</b>	218 (for 24 Vac/dc) / 147 (for 120 Vac and 230 Vac)
<b>Diagnostic coverage</b>	H
<b>PFHd</b>	4,58 E <sup>-10</sup> (for 24 Vac/dc) / 6,61 E <sup>-10</sup> (for 120 Vac and 230 Vac)

### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b> (acc. to IEC/EN 60947-1)	250 V (degree of pollution 3)
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (acc. to IEC/EN 60947-1)	4 kV
<b>Power supply</b>	
Rated operating voltage $U_N$ ( $\pm 15\%$ )	24 Vac/dc (10% max residual ripple in DC) - 120 Vac - 230 Vac
Rated power consumption	max 5 VA (ac) - max 2 W (dc)
<b>Control circuit</b>	
Protection against short circuits	Resistance PTC with intervention operating time >100ms, reset time >3s - I <sub>h</sub> =0,5A
Input max resistance	50Ω
Input max current	30mA

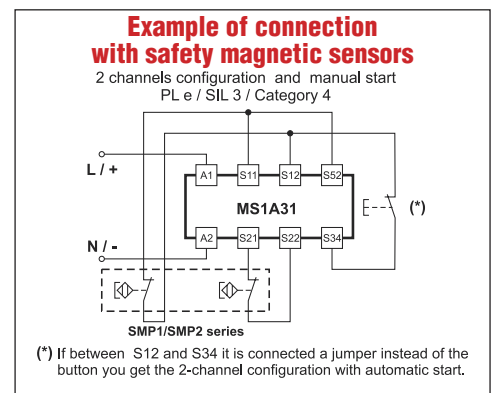


### Output circuit

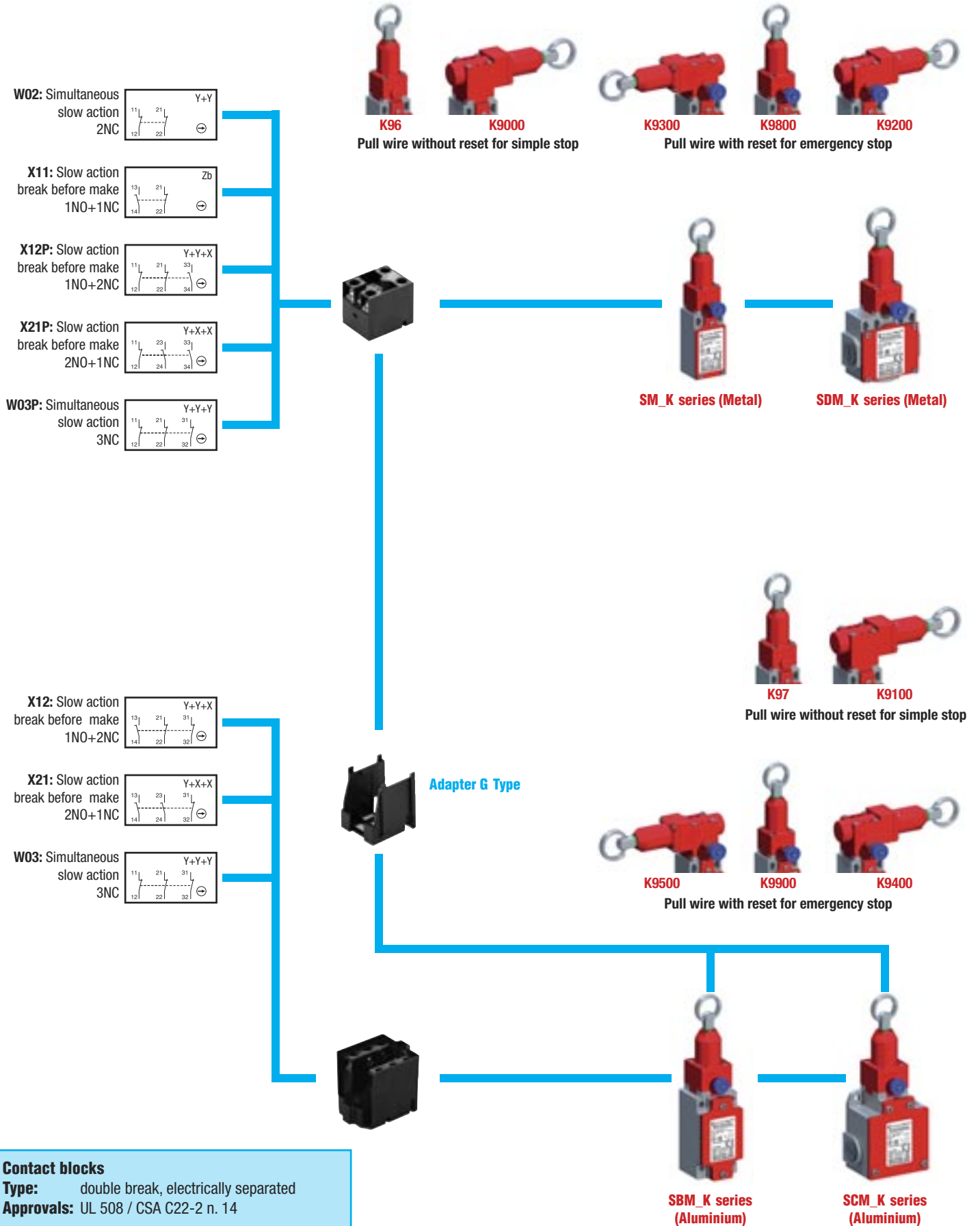
Utilization categories (according to EN 60947-1)	AC 15, $U_e = 230 V$ , $I_e = 3 A$ / DC 13, $U_e = 24 V$ , $I_e = 6 A$ (6 oper/minute)
Max switching voltage	240 Vac / 300 Vdc
Switching current range (per contact)	min 10 mA - max 6A (external protection fuse 6A F type)
Conventional free air thermal current $I_{th}$	6A (max current sum: 64A <sup>2</sup> )
Max contact resistance	100 mΩ



**Download**  
Instruction sheet – Safety modules MS1  
CE declaration



## Safety Limit Switches with rope



### Contact blocks

**Type:** double break, electrically separated

**Approvals:** UL 508 / CSA C22-2 n. 14



## Safety Limit Switches with rope - Description

### Applications

Easy to use, the limit switches for safety applications with rope for simple and emergency stop offer specific qualities:

- Capability for strong current switching (conventional thermal current 10 A).
- Contact blocks with positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖).
- Electrically separated contacts.
- Precision on operating positions (consistency).
- Immunity to electromagnetic disturbances.

The use of the Comepi pull wire safety switches allows you to create perimeter protections of the machines, thus reducing the need to install sever emergency stop stations in different points of the machine. They comply with the requirements of European Directives (Low Voltage and Machines Directive) and are conform to European and international standards.

### Description

SM/SDM series are made of zinc alloy (zamack). SBM/SCM series are realized in aluminium material, therefore they are mechanically more resistant and three times lighter than the ones in zinc alloy. All metal limit switches have a degree of protection IP66.

**Casing**

- 30 mm. width with standardized dimensions acc. to EN 50047
- 50 mm. width
- 40 mm. width with standardized dimensions acc. to EN 50041
- 60 mm. width

**Mounting the casing**

- 2 x M4 screws on top part for 30 mm. width
- 2 or 4 x M4 screws on top part for 50 mm. width
- 2 or 4 x M5 screws on top part for 40 mm. width
- 2 x M5 screws on top part for 60 mm. width

**Contact Block:**

- Positive opening operation
- Slow action contacts
- Contacts are electrically separated

**Connecting terminals:**

- Block of 2 contacts: M3.5 (+, -) pozidriv 2 screw
- Block of 3 contacts: M3 (+, -) screw
- Screw head with captive cable clamp
- Markings conform with IEC 60947-1, IEC 60947-5-1 standard

**Operating heads:**

- Straight
- 90° right
- 90° left

**Reset:**

- Manual reset button for emergency stop

**Cover:**

- 3 screws for 30 mm. casing
- 2 screws for 40 mm. casing
- 4 screws for 50 and 60 mm. casing

**Electrical connection:**

- 1 x cable gland for SM/SBM series
- 3 x cable gland for SBM/SCM series

### Symbols

Example: 

SD	M	1	K	10	X	1	1
----	---	---	---	----	---	---	---

Structure: 

	M		K				
--	---	--	---	--	--	--	--

**Casing width:**

**S** = 30 mm width + 1 cable inlet  
**SB** = 40 mm width + 1 cable inlet  
**SC** = 60 mm width + 3 cable inlets  
**SD** = 50 mm width + 3 cable inlets

**M:** Metal (SM, SDM) / Aluminium (SBM, SCM) casing

**Electrical connection**

**1:** cable inlets for PG13.5 cable gland  
**2:** cable inlets for 1/2 NPT cable gland  
**3:** cable inlets for PG11 cable gland (only for SM and SDM series)  
**4:** cable inlets for M16 x 1,5 cable gland (only for SM and SDM series)  
**5:** cable inlets for M20 x 1,5 cable gland  
**6:** M12 4 poles connector  
**7:** M12 5 poles connector  
**8:** M12 8 poles connector

**Operating heads:**  
 codes 96, 9000, 9300, 9800, 9200, 97, 9100, 9500, 9900, 9400

**Contact block**

**11:** 1 NO + 1 NC contacts  
**02:** 2 NC contacts  
**12P:** 1 NO + 2 NC contacts  
**21P:** 2 NO + 1 NC contacts  
**03P:** 3 NC contacts

**Only for SBM, SCM series:**

**12:** 1 NO + 2NC contacts  
**21:** 2 NO + 1 NC contacts  
**03:** 3 NC contacts

**W:** Slow action (contact dependent)  
**X:** Slow action non-overlapping late make

## Safety Limit Switches with rope - Technical Data

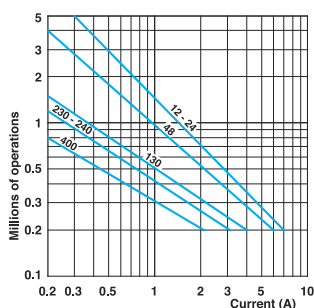
### SM / SBM / SCM / SDM Series

<b>Standards</b>	IEC 60947-5-1, EN 60947-5-1 EN 60947-5-5 (models with reset)
<b>Certifications - Approvals</b>	UL - CSA - IMQ - EAC - CCC
<b>Air temperature</b> near the device	
- during operation	- 25 ... + 70
- for storage	- 30 ... + 80
<b>Mounting positions</b>	All positions are authorised
<b>Protection against electrical shocks</b> (acc. to IEC 61140)	Class I
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	IP 66

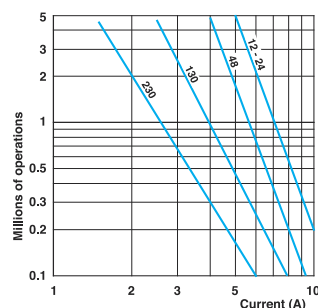
### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b> - according to IEC 60947-1 and EN 60947-1 - according to UL 508 and CSA C22-2 n° 14		500 V (degree of pollution 3) (400 V for contacts type Z02, X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for SM/SDM series and contacts type X12P, X21P, W03P)
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (according to IEC 60947-1 and EN 60947-1)	kV	6
<b>Conventional free air thermal current <math>I_{th}</math></b> (according to IEC 60947-5-1) $\theta < 40$ °C	A	10
<b>Short-circuit protection</b> $U_e < 500$ V a.c. - gG (gl) type fuses	A	10
<b>Rated operational current</b> $I_e$ / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz A 120 V - 50/60 Hz A 400 V - 50/60 Hz A	10 6 4 (1.8A for contacts type X12, X21, W03)
$I_e$ / DC-13 (according to IEC 60947-5-1)	24 V - d.c. A 125 V - d.c. A 250 V - d.c. A	6 (2.8A for contacts type X12, X21, W03) 0.55 0.4 (0.27A for contacts type X12, X21, W03)
<b>Switching frequency</b>	Cycles/h	3600
<b>Load factor</b>		0.5
<b>Resistance between contacts</b>	m $\Omega$	25
<b>Connecting terminals</b>		M3.5 (+, -) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)
<b>Terminal for protective conductor</b>		M3.5 (+, -) pozidriv 2 screw with cable clamp
<b>Connecting capacity</b>	1 or 2 x mm <sup>2</sup>	0.34 ... 2.5 (0.34... 1.5 for 3 poles contacts type)
<b>Terminal marking</b>		According to IEC 60947-5-1
<b>Mechanical durability</b>		500.000 operations
<b>Electrical durability</b> (according to IEC 60947-5-1)		Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)
<b>B10d</b>		1 million of operations

AC-15 - Snap action



AC-15 - Slow action



		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W

## Safety Limit Switches with rope - Technical Data

### Technical data approved by IMQ

<b>Standards</b>	Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards		
<b>Degree of protection</b>	IP 66		
<b>Rated insulation voltage <math>U_i</math></b>	500 V (degree of pollution 3) (400 V for contacts type Z02, X12P, X21P, W03P)		
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV		
<b>Conventional free air thermal current <math>I_{th}</math></b>	10 A		
<b>Short-circuit protection - gG (gl) type fuses</b>	10 A		
<b>Rated operational current</b>			
<b><math>I_e</math> / AC-15</b>	24 V - 50/60 Hz	10 A	
	400 V - 50/60 Hz	4 A (1.8A for contacts type X12, X21, W03)	
<b><math>I_e</math> / DC-13</b>	24 V - d.c.	6 A (2.8A for contacts type X12, X21, W03)	
	125 V - d.c.	0,55 A	
	250 V - d.c.	0.4 A (0.27A for contacts type X12, X21, W03)	

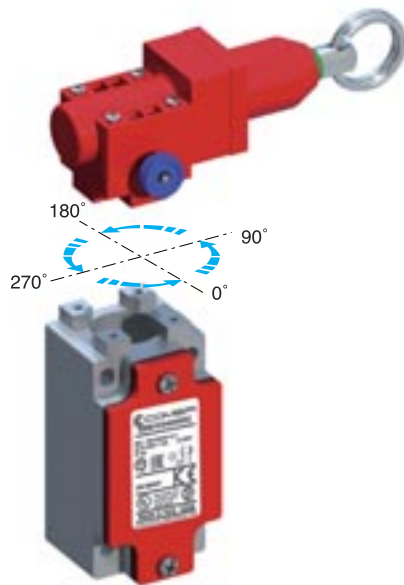
### Technical data approved by UL

<b>Standards</b>	Devices conform with UL 508	
<b>Contact blocks type Z11, X11, Y11, W02 and Z02</b>	A600, Q600	
<b>Utilization categories</b>	(A300, Q300 when installed in SM/SDM series)	
<b>Contact blocks type X12, X21, W03</b>	A600, Q600	
<b>Utilization categories</b>	A600, Q600	
<b>Contact blocks type X12P, X21P and W03P</b>	A300, Q300	
<b>Utilization categories</b>	A300, Q300	
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.		
For the complete list of approved products, contact our technical department		

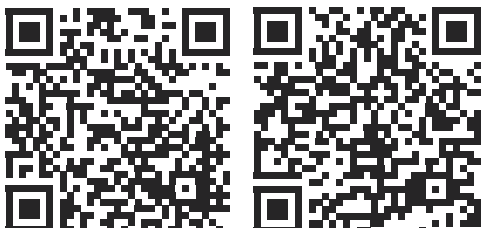
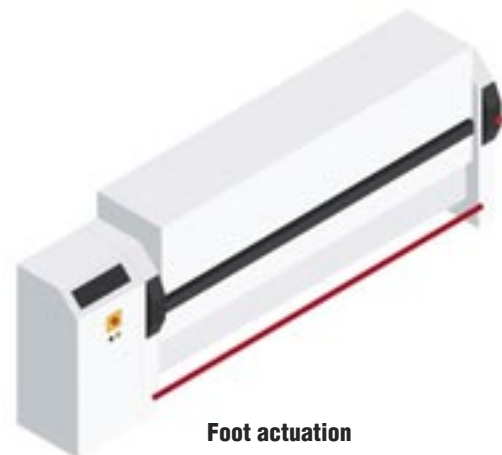
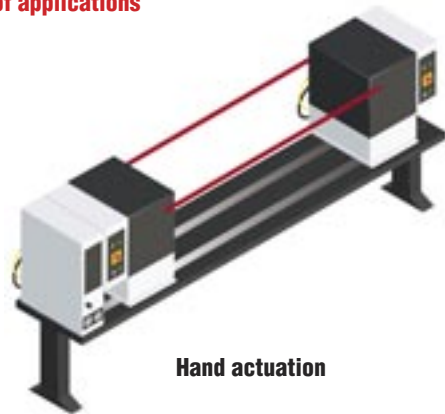
## Implementation

### Operating head orientation

The head can be rotated each 90°. Recommended tightening torque 0,5 Nm (max 0,8 Nm).



### Examples of applications



**Download**  
Instruction sheet – Pull wire safety limit switches  
CE declaration

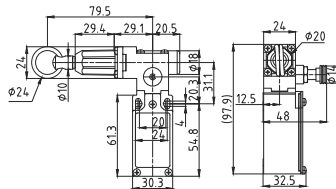
## Pull wire with reset for emergency stop - Metal casing - IP66

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

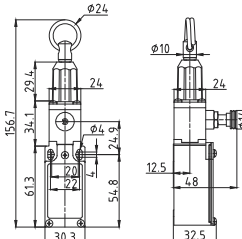
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 7: M12 5 poles connector
- 8: M12 8 poles connector

**K9300** Pull wire with reset for emergency stop



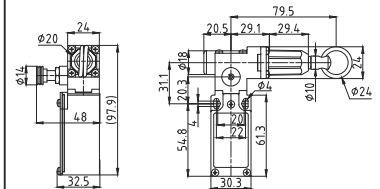
Min. forces Initial 65N, Final 85N (95N ⊖)  
Weight 275 g  
Operating diagram Page 72

**K9800** Pull wire with reset for emergency stop



Min. forces Initial 60N, Final 80N (90N ⊖)  
Weight 230 g  
Operating diagram Page 72

**K9200** Pull wire with reset for emergency stop



Min. forces Initial 65N, Final 85N (95N ⊖)  
Weight 275 g  
Operating diagram Page 72

### Contact Blocks

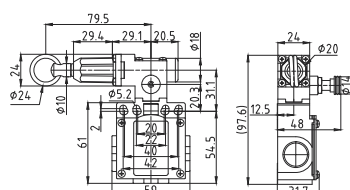
<b>X11</b> (1NO+1NC)	SM•K9300X11	SM•K9800X11	SM•K9200X11
<b>W02</b> (2NC)	SM•K9300W02	SM•K9800W02	SM•K9200W02
<b>X12P</b> (1NO+2NC)	SM•K9300X12P	SM•K9800X12P	SM•K9200X12P
<b>X21P</b> (2NO+1NC)	SM•K9300X21P	SM•K9800X21P	SM•K9200X21P
<b>W03P</b> (3NC)	SM•K9300W03P	SM•K9800W03P	SM•K9200W03P

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

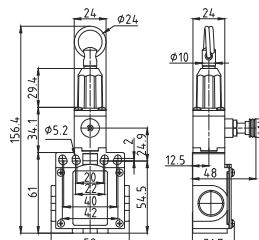
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

**K9300** Pull wire with reset for emergency stop



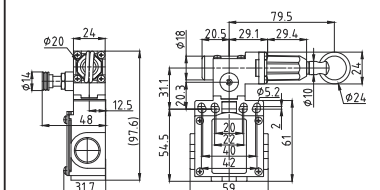
Min. forces Initial 65N, Final 85N (95N ⊖)  
Weight 365 g  
Operating diagram Page 72

**K9800** Pull wire with reset for emergency stop



Min. forces Initial 60N, Final 80N (90N ⊖)  
Weight 320 g  
Operating diagram Page 72

**K9200** Pull wire with reset for emergency stop



Min. forces Initial 65N, Final 85N (95N ⊖)  
Weight 365 g  
Operating diagram Page 72

### Contact Blocks

<b>X11</b> (1NO+1NC)	SDM•K9300X11	SDM•K9800X11	SDM•K9200X11
<b>W02</b> (2NC)	SDM•K9300W02	SDM•K9800W02	SDM•K9200W02
<b>X12P</b> (1NO+2NC)	SDM•K9300X12P	SDM•K9800X12P	SDM•K9200X12P
<b>X21P</b> (2NO+1NC)	SDM•K9300X21P	SDM•K9800X21P	SDM•K9200X21P
<b>W03P</b> (3NC)	SDM•K9300W03P	SDM•K9800W03P	SDM•K9200W03P



## Pull wire with reset for emergency stop - Metal casing - IP66

### Electrical connection:

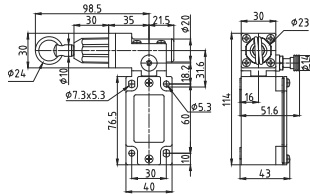
Replace the symbol “•” with the number of the thread desired

1: Cable gland PG 13.5

2: Cable gland 1/2” NPT

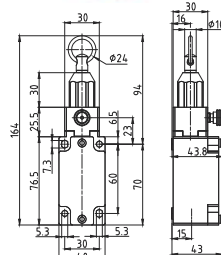
5: Cable gland M20 x 1,5

### K9500 Pull wire with reset for emergency stop



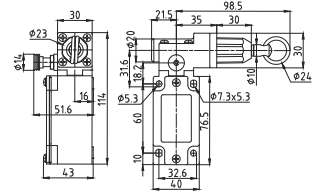
Min. forces Initial 150N, Final 215N (230N ☺)  
Weight 320 g  
Operating diagram Page 72

### K9900 Pull wire with reset for emergency stop



Min. forces Initial 120N, Final 160N (170N ☺)  
Weight 250 g  
Operating diagram Page 72

### K9400 Pull wire with reset for emergency stop



Min. forces Initial 150N, Final 215N (230N ☺)  
Weight 320 g  
Operating diagram Page 72

### Contact Blocks

X11 (1NO+1NC)	SBM•K9500X11	SBM•K9900X11	SBM•K9400X11
W02 (2NC)	SBM•K9500W02	SBM•K9900W02	SBM•K9400W02
X12 (1NO+2NC)	SBM•K9500X12	SBM•K9900X12	SBM•K9400X12
X21 (2NO+1NC)	SBM•K9500X21	SBM•K9900X21	SBM•K9400X21
W03 (3NC)	SBM•K9500W03	SBM•K9900W03	SBM•K9400W03

### Electrical connection:

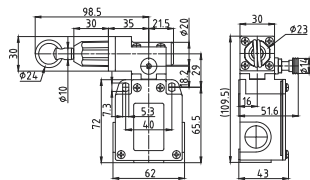
Replace the symbol “•” with the number of the thread desired

1: Cable gland PG 13.5

2: Cable gland 1/2” NPT

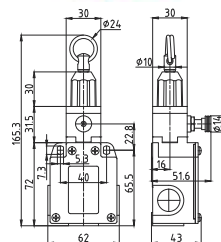
5: Cable gland M20 x 1,5

### K9500 Pull wire with reset for emergency stop



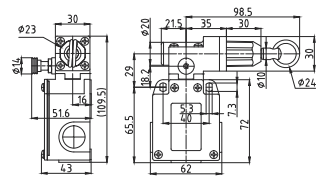
Min. forces Initial 150N, Final 215N (230N ☺)  
Weight 345 g  
Operating diagram Page 72

### K9900 Pull wire with reset for emergency stop



Min. forces Initial 120N, Final 160N (170N ☺)  
Weight 275 g  
Operating diagram Page 72

### K9400 Pull wire with reset for emergency stop



Min. forces Initial 150N, Final 215N (230N ☺)  
Weight 345 g  
Operating diagram Page 72

### Contact Blocks

X11 (1NO+1NC)	SCM•K9500X11	SCM•K9900X11	SCM•K9400X11
W02 (2NC)	SCM•K9500W02	SCM•K9900W02	SCM•K9400W02
X12 (1NO+2NC)	SCM•K9500X12	SCM•K9900X12	SCM•K9400X12
X21 (2NO+1NC)	SCM•K9500X21	SCM•K9900X21	SCM•K9400X21
W03 (3NC)	SCM•K9500W03	SCM•K9900W03	SCM•K9400W03



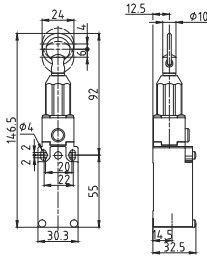
## Pull wire without reset for simple stop - Metal casing - IP66

### Electrical connection:

Replace the symbol “●” with the number of the thread desired

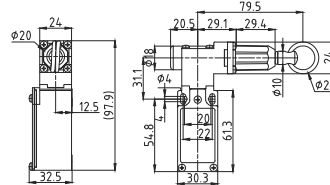
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 7: M12 5 poles connector
- 8: M12 8 poles connector

### K96 Pull wire without reset for simple stop



Min. forces Initial 60N, Final 80N (90N ⊖)  
 Weight 220 g  
 Operating diagram Page 72

### K9000 Pull wire without reset for simple stop



Min. forces Initial 65N, Final 85N (95N ⊖)  
 Weight 265 g  
 Operating diagram Page 72

### Contact Blocks

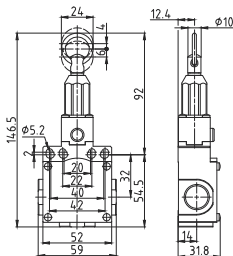
X11 (1NO+1NC)	SM•K96X11	SM•K9000X11
W02 (2NC)	SM•K96W02	SM•K9000W02
X12P (1NO+2NC)	SM•K96X12P	SM•K9000X12P
X21P (2NO+1NC)	SM•K96X21P	SM•K9000X21P
W03P (3NC)	SM•K96W03P	SM•K9000W03P

### Electrical connection:

Replace the symbol “●” with the number of the thread desired

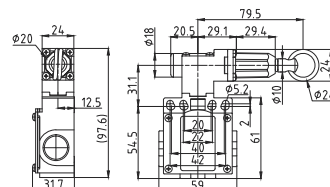
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

### K96 Pull wire without reset for simple stop



Min. forces Initial 60N, Final 80N (90N ⊖)  
 Weight 310 g  
 Operating diagram Page 72

### K9000 Pull wire without reset for simple stop



Min. forces Initial 65N, Final 85N (95N ⊖)  
 Weight 355 g  
 Operating diagram Page 72

### Contact Blocks

X11 (1NO+1NC)	SDM•K96X11	SDM•K9000X11
W02 (2NC)	SDM•K96W02	SDM•K9000W02
X12P (1NO+2NC)	SDM•K96X12P	SDM•K9000X12P
X21P (2NO+1NC)	SDM•K96X21P	SDM•K9000X21P
W03P (3NC)	SDM•K96W03P	SDM•K9000W03P

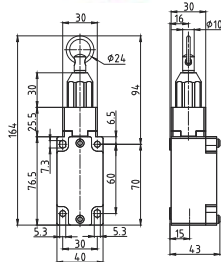
## Pull wire without reset for simple stop - Metal casing - IP66

### Electrical connection:

Replace the symbol “●” with the number of the thread desired

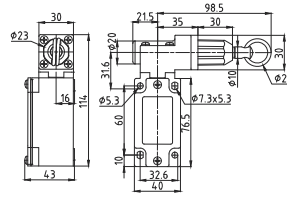
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT
- 5: Cable gland M20 x 1,5

### K97 Pull wire without reset for simple stop



Min. forces Initial 120N, Final 160N (170N ☺)  
 Weight 240 g  
 Operating diagram Page 72

### K9100 Pull wire without reset for simple stop



Min. forces Initial 150N, Final 215N (230N ☺)  
 Weight 310 g  
 Operating diagram Page 72

### Contact Blocks

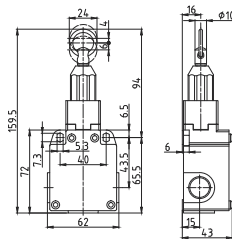
X11 (1NO+1NC)	SBM•K97X11	SBM•K9100X11
W02 (2NC)	SBM•K97W02	SBM•K9100W02
X12 (1NO+2NC)	SBM•K97X12	SBM•K9100X12
X21 (2NO+1NC)	SBM•K97X21	SBM•K9100X21
W03 (3NC)	SBM•K97W03	SBM•K9100W03

### Electrical connection:

Replace the symbol “●” with the number of the thread desired

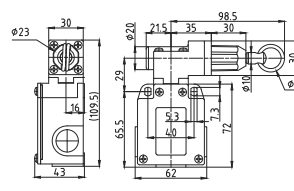
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT
- 5: Cable gland M20 x 1,5

### K97 Pull wire without reset for simple stop



Min. forces Initial 120N, Final 160N (170N ☺)  
 Weight 265 g  
 Operating diagram Page 72

### K9100 Pull wire without reset for simple stop

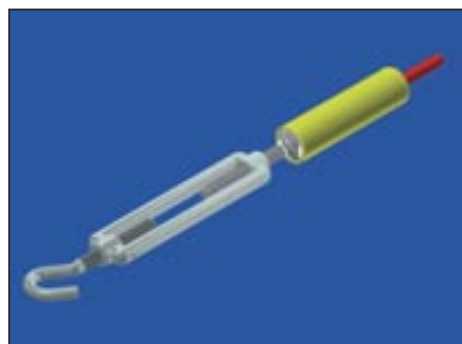
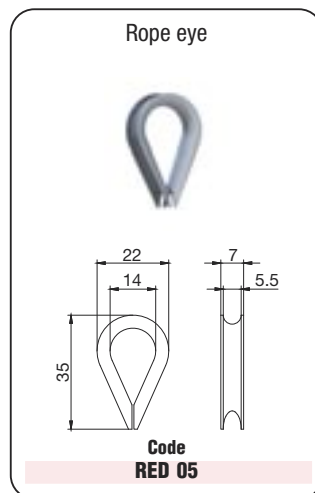
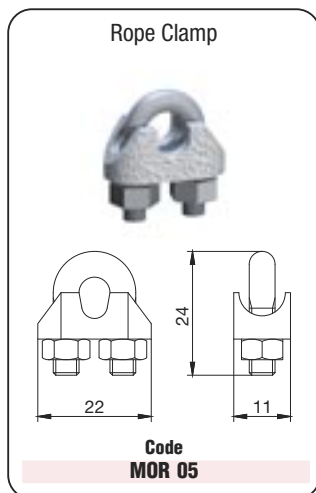
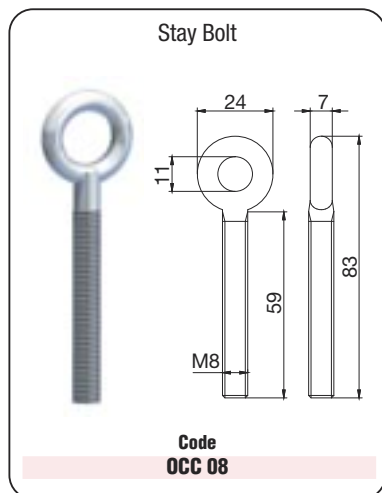


Min. forces Initial 150N, Final 215N (230N ☺)  
 Weight 335 g  
 Operating diagram Page 72

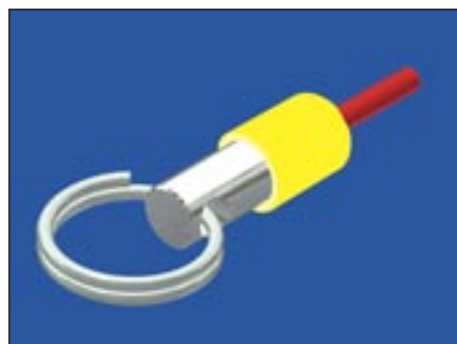
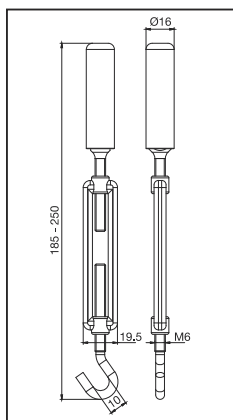
### Contact Blocks

X11 (1NO+1NC)	SCM•K97X11	SCM•K9100X11
W02 (2NC)	SCM•K97W02	SCM•K9100W02
X12 (1NO+2NC)	SCM•K97X12	SCM•K9100X12
X21 (2NO+1NC)	SCM•K97X21	SCM•K9100X21
W03 (3NC)	SCM•K97W03	SCM•K9100W03

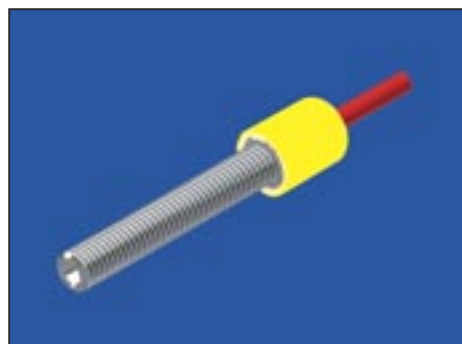
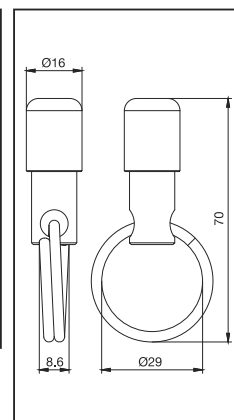
## Safety Limit Switches with rope - Accessories



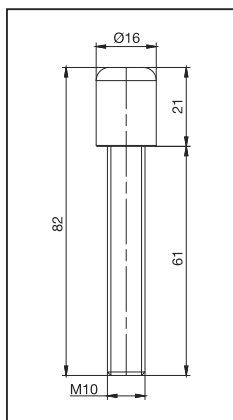
Code **SLS-FX1** Description Hook stay bolt



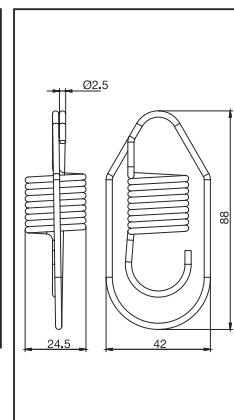
Code **SLS-FX2** Description Fixing clamp



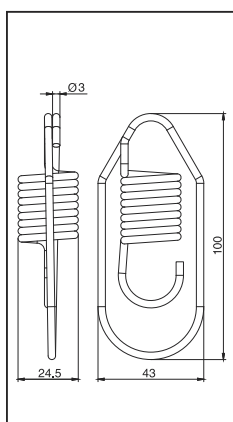
Code **SLS-FX3** Description Stay bolt



Code **SLS-M1** Description Spring for SM, SDM series



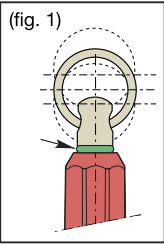
Code **SLS-M2** Description Spring for SBM, SCM series



## Safety Limit Switches with rope

### Installation instructions

(fig. 1)



In order to obtain the correct operation of the device, please follow the following instructions.

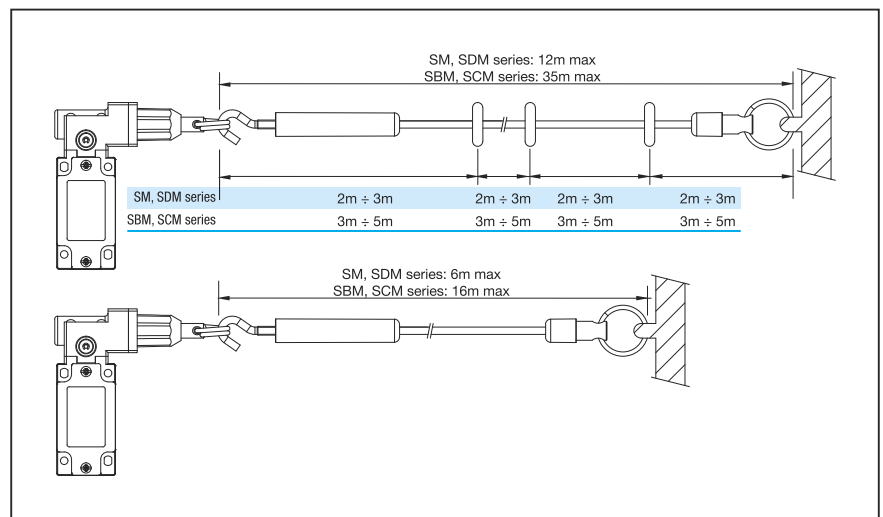
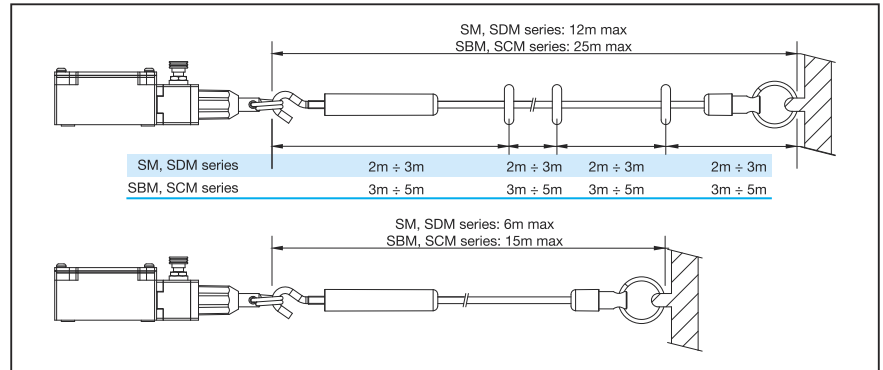
1. Install the switch and secure the fixed end of the rope. Apply tension to the extent the green O-ring is visible and the bottom is flush with the end of the red housing. (Fig. 1).

2. Pull the reset pommel in order to close the safety contacts of the limit switch.
3. The contacts inside the limit switch will change their position whenever the rope is pulled or loose its tension.
4. Check the correct operation of the rope switch before you start the machine and periodically.

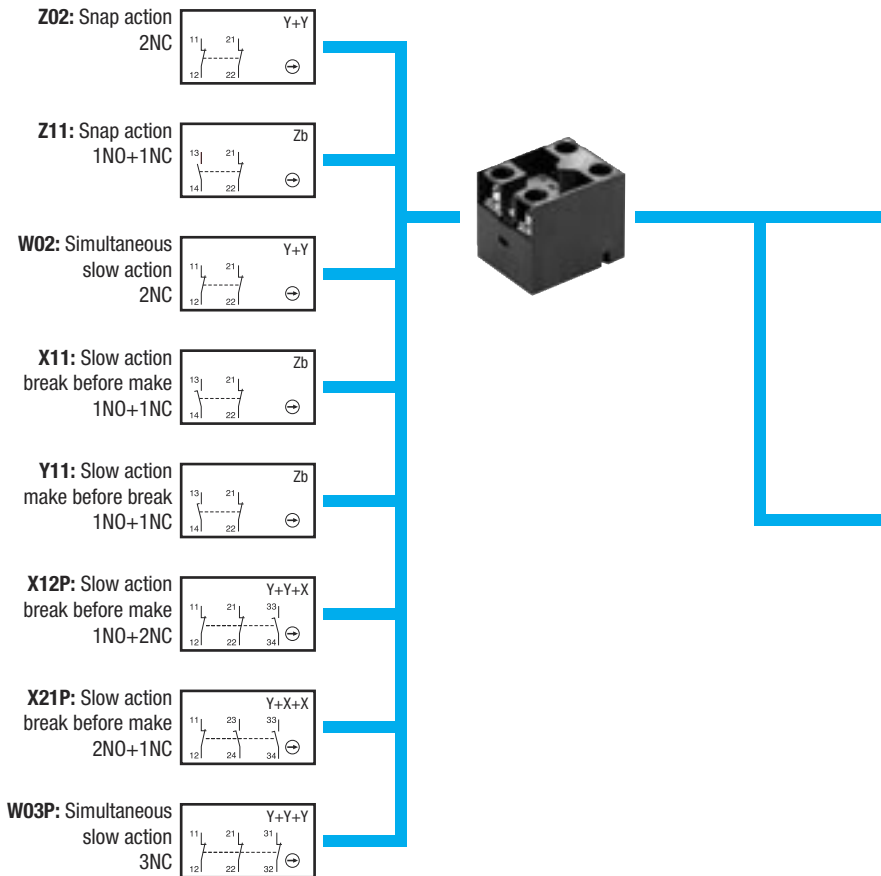
Performing the role of worker protection, improper installation or tampering with safety devices can cause serious injury to persons.

The installation must therefore be performed in accordance with local legislation and only by authorized personnel.

For any question about CE declaration of conformity or for any information and assistance, please contact our technical department



## Safety Limit Switches with reset



**Contact blocks**  
**Type:** double break, electrically separated  
**Approvals:** UL 508 / CSA C22-2 n. 14

## Safety Limit Switches with reset - Description

### Applications

Easy to use, the limit switches for safety applications with latch and manual reset offer specific qualities:

- Visible operation (fault memorisation).
- Capability for strong current switching (conventional thermal current 10 A).
- Contact blocks with positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖ ).
- Electrically separated contacts.
- Precision on operating positions (consistency).
- Immunity to electromagnetic disturbances.

**These specific features make the limit switches ideal for detection and monitoring of faults in hoisting machines, electric lifts, freight elevators, escalators, conveyor belts, etc.** They comply with the requirements of European Directives (Low Voltage and Machines Directives) and are conform to European and international standards.

### Description

Limit switches with latch and manual reset are equipped with operating heads with plunger, roller plunger or roller lever, used to detect rectilinear or angular movements. AP/DP series are made of fibre-glass reinforced UL-V0 thermoplastic material, they offer double insulation  $\square$  and a degree of protection IP65.

AM/DM series are made of zinc alloy (zamack) and have a degree of protection IP66. Limit switches with latch and manual reset are equipped with 1NO+1NC, 2NC, 1NO+2NC, 2NO+1NC or 3NC contact blocks with positive opening operation of the "N.C." contact(s). After actuating the control device and overshooting the latching point, the N.C. safety contact(s) remain in the open position. **Return to the initial operating state takes place by voluntary action on the reset button.**

**Casing**

- 30 mm. width with standardized dimensions acc. to EN 50047
- 50 mm. width with standardized dimensions

**Mounting the casing**

- 2 x M4 screws on top part for 30 mm. width
- 2 or 4 x M4 screws on top part for 50 mm. width

**Contact Block:**

- Positive opening operation
- Snap action or slow action
- Contacts are electrically separated

**Connecting terminals:**

- Block of 2 contacts: M3.5 (+, -) pozidriv 2 screw
- Block of 3 contacts: M3 (+, -) screw
- Screw head with captive cable clamp
- Markings conform with IEC 60947-1, IEC 60947-5-1 standard

**A variety of operating heads:**

- Metal plunger
- Metal plunger and nylon roller
- Nylon roller lever

• Other levers available upon request

**Reset:**

- Manual reset button

**Cover:**

- 1 or 3 screws for 30 mm. casing
- 1 or 4 screws for 50 mm. casing

**Electrical connection:**

- 1 x cable gland for AP and AM series
- 2 x cable gland for DP series
- 3 x cable gland for DM series

### Symbols

Example: 

A	P	1	R	41	Z	1	1
---	---	---	---	----	---	---	---

  
 Structure: 

			R				
--	--	--	---	--	--	--	--

<p><b>Casing width:</b></p> <p><b>A</b> = 30 mm width + 1 cable inlet  <b>D</b> = 50 mm width + 2 cable inlets (DP series) or 3 cable inlets (DM series)</p> <p><b>P: Plastic casing M: Metal casing</b></p> <p><b>Electrical connection</b></p> <p><b>1:</b> cable inlets for PG13.5 cable gland  <b>2:</b> cable inlets for 1/2 NPT cable gland *  <b>3:</b> cable inlets for PG11 cable gland  <b>4:</b> cable inlets for M16 x 1,5 cable gland  <b>5:</b> cable inlets for M20 x 1,5 cable gland  <b>6:</b> M12 4 poles connector  <b>7:</b> M12 5 poles connector  <b>8:</b> M12 8 poles connector</p> <p><b>Manual reset version</b></p>	<p><b>Contact block</b></p> <p><b>11:</b> 1 NO + 1 NC contacts  <b>02:</b> 2 NC contacts  <b>12P:</b> 1 NO + 2 NC contacts  <b>21P:</b> 2 NO + 1 NC contacts  <b>03P:</b> 3 NC contacts</p> <p><b>Z:</b> Snap action  <b>W:</b> Slow action (contact dependent)  <b>X:</b> Slow action non-overlapping late make  <b>Y:</b> Slow action overlapping early make</p> <p><b>Operating heads:</b> codes 11-13-31-32-38-41-51              • Other levers available upon request</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

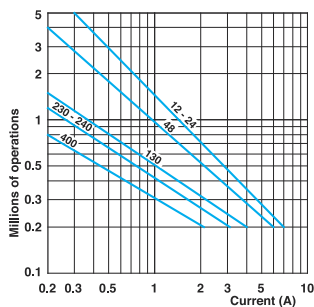
\* In AP... and DP... series, the 1/2" NPT thread is obtained by the use of a plastic adapter (delivered not mounted).

	AP / DP Series	AM / DM Series
<b>Standards</b>	IEC 60947-5-1 EN 60947-5-1	
<b>Certifications - Approvals</b>	UL - CSA - IMQ - EAC - CCC	
<b>Air temperature</b> near the device		
- during operation	- 25 ... + 70	
- for storage	- 30 ... + 80	
<b>Mounting positions</b>	All positions are authorised	
<b>Protection against electrical shocks</b> (acc. to IEC 61140)	Class II	Class I
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	IP 65	IP 66

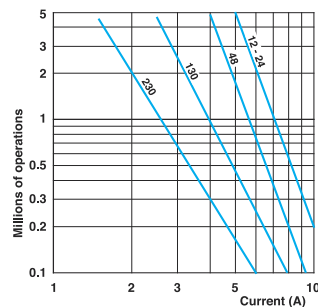
### Electrical Data

<b>Rated insulation voltage <math>U_i</math></b> - according to IEC 60947-1 and EN 60947-1 - according to UL 508 and CSA C22-2 n° 14	500 V (degree of pollution 3) (400 V for contacts type Z02, X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for AM/DM series and contacts type X12P, X21P, W03P)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b> (according to IEC 60947-1 and EN 60947-1)	kV	6
<b>Conventional free air thermal current <math>I_{th}</math></b> (according to IEC 60947-5-1) $\theta < 40$ °C	A	10
<b>Short-circuit protection</b> $U_e < 500$ V a.c. - gG (gl) type fuses	A	10
<b>Rated operational current</b> $I_e$ / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz A 120 V - 50/60 Hz A 400 V - 50/60 Hz A	10 6 4
$I_e$ / DC-13 (according to IEC 60947-5-1)	24 V - d.c. A 125 V - d.c. A 250 V - d.c. A	6 0.55 0.4
<b>Switching frequency</b>	Cycles/h	3600
<b>Load factor</b>		0.5
<b>Resistance between contacts</b>	m $\Omega$	25
<b>Connecting terminals</b>	M3.5 (+, -) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)	
<b>Terminal for protective conductor</b>	- M3.5 (+, -) pozidriv 2 screw with cable clamp	
<b>Connecting capacity</b>	1 or 2 x mm <sup>2</sup>	0.34 ... 2.5 (0.34... 1.5 for 3 poles contacts type)
<b>Terminal marking</b>	According to IEC 60947-5-1	
<b>Mechanical durability</b>	1 million of operations	
<b>Electrical durability</b> (according to IEC 60947-5-1)	Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)	
<b>B10d</b>	1 million of operations	

#### AC-15 - Snap action



#### AC-15 - Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W



### Technical data approved by IMQ

<b>Standards</b>	Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards	
<b>Degree of protection</b>	IP 65 (AP/DP series) , IP 66 (AM/DM series)	
<b>Rated insulation voltage <math>U_i</math></b>	500 V (degree of pollution 3) (400V for type Z02, X12P, X21P, W03P)	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV	
<b>Conventional free air thermal current <math>I_{th}</math></b>	10 A	
<b>Short-circuit protection - gG (gl) type fuses</b>	10 A	
<b>Rated operational current</b>		
<b><math>I_e</math> / AC-15</b>	24 V - 50/60 Hz	10 A
	400 V - 50/60 Hz	4 A
<b><math>I_e</math> / DC-13</b>	24 V - d.c.	6 A
	125 V - d.c.	0.55 A
	250 V - d.c.	0.4 A

### Technical data approved by UL

<b>Standards</b>	Devices conform with UL 508
<b>Contact blocks type Z11, X11, Y11, W02 and Z02</b>	A600, Q600
<b>Utilization categories</b>	(A300, Q300 when installed in AM/DM series)

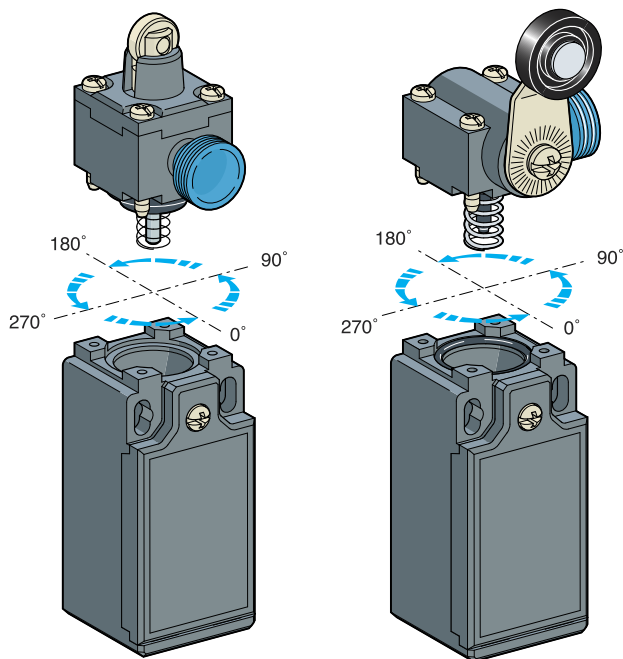
<b>Contact blocks type X12P, X21P and W03P</b>	A300, Q300
<b>Utilization categories</b>	A300, Q300
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.	

For the complete list of approved products, contact our technical department

## Implementation

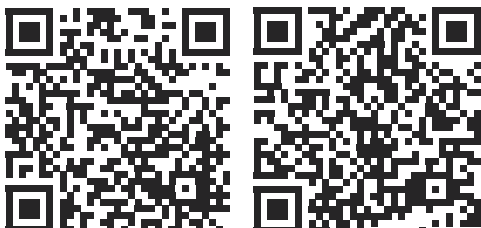
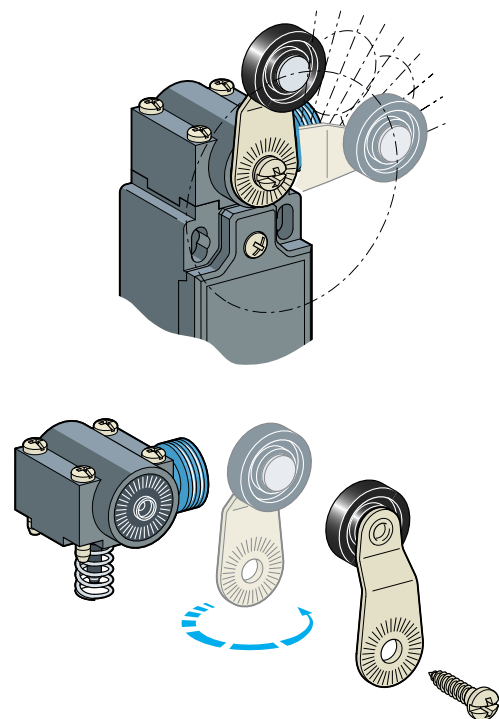
### Operating head orientation

The head can be rotated each 90°. Recommended tightening torque 0,5 Nm (max 0,8 Nm).



### Lever adjustment

The lever of the head model R41 can be adjusted every 10° and round turned in order to, obtain the maximum flexibility on the working plan. Recommended tightening torque 0,5 Nm (max 0,8 Nm).



### Download

Instruction sheet – Limit switches with manual reset  
CE declaration

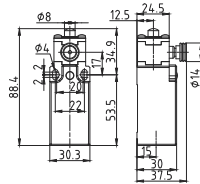
## Polymeric casing. Polymer head. 30 mm width. 1 cable inlet - IP65

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

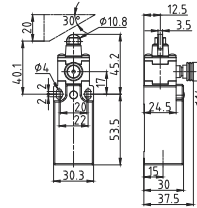
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 6: M12 4 poles connector
- 7: M12 5 poles connector
- 8: M12 8 poles connector

### R11 Steel plunger with reset



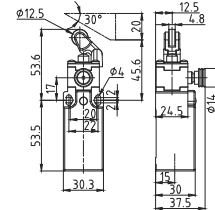
Min. actuating force	15 N (30N ⊖)
Weight	90 g
Operating diagram	Page 70

### R13 Steel plunger with nylon roller with reset



Min. actuating force	12 N (30N ⊖)
Weight	90 g
Operating diagram	Page 70

### R31 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	95 g
Operating diagram	Page 70

### Contact Blocks

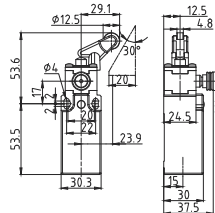
Z11 (1NO+1NC)	AP•R11Z11	AP•R13Z11	AP•R31Z11
X11 (1NO+1NC)	AP•R11X11	AP•R13X11	AP•R31X11
Y11 (1NO+1NC)	AP•R11Y11	AP•R13Y11	AP•R31Y11
W02 (2NC)	AP•R11W02	AP•R13W02	AP•R31W02
Z02 (2NC)	AP•R11Z02	AP•R13Z02	AP•R31Z02
X12P (1NO+2NC)	AP•R11X12P	AP•R13X12P	AP•R31X12P
X21P (2NO+1NC)	AP•R11X21P	AP•R13X21P	AP•R31X21P
W03P (3NC)	AP•R11W03P	AP•R13W03P	AP•R31W03P

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

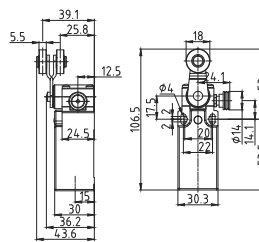
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 6: M12 4 poles connector
- 7: M12 5 poles connector
- 8: M12 8 poles connector

### R32 Steel plunger with nylon roller with reset



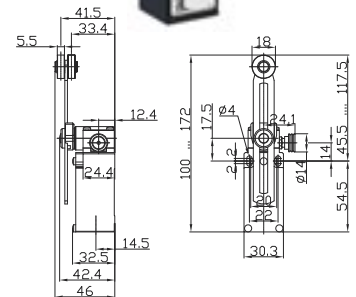
Min. actuating force	7 N (24N ⊖)
Weight	95 g
Operating diagram	Page 70

### R41 Lever with nylon roller with reset



Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	95 g
Operating diagram	Page 70

### R51 Adjustable lever with nylon roller with reset



Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	105 g
Operating diagram	Page 70

### Contact Blocks

Z11 (1NO+1NC)	AP•R32Z11	AP•R41Z11	AP•R51Z11
X11 (1NO+1NC)	AP•R32X11	AP•R41X11	AP•R51X11
Y11 (1NO+1NC)	AP•R32Y11	AP•R41Y11	AP•R51Y11
W02 (2NC)	AP•R32W02	AP•R41W02	AP•R51W02
Z02 (2NC)	AP•R32Z02	AP•R41Z02	AP•R51Z02
X12P (1NO+2NC)	AP•R32X12P	AP•R41X12P	AP•R51X12P
X21P (2NO+1NC)	AP•R32X21P	AP•R41X21P	AP•R51X21P
W03P (3NC)	AP•R32W03P	AP•R41W03P	AP•R51W03P

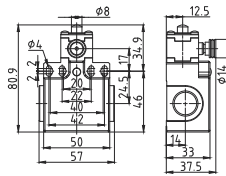
## Polymeric casing. Polymer head. 50 mm width. 2 cable inlets - IP65

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

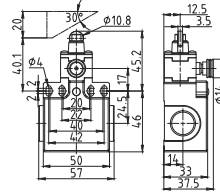
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

### R11 Steel plunger with reset



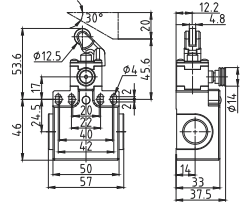
Min. actuating force      **15 N (30N ⊖)**  
 Weight                      **120 g**  
 Operating diagram        **Page 70**

### R13 Steel plunger with nylon roller with reset



Min. actuating force      **12 N (30N ⊖)**  
 Weight                      **120 g**  
 Operating diagram        **Page 70**

### R31 Steel plunger with nylon roller with reset



Min. actuating force      **7 N (24N ⊖)**  
 Weight                      **125 g**  
 Operating diagram        **Page 70**

### Contact Blocks

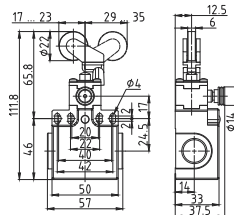
Z11 (1NO+1NC)	DP•R11Z11	DP•R13Z11	DP•R31Z11
X11 (1NO+1NC)	DP•R11X11	DP•R13X11	DP•R31X11
Y11 (1NO+1NC)	DP•R11Y11	DP•R13Y11	DP•R31Y11
W02 (2NC)	DP•R11W02	DP•R13W02	DP•R31W02
Z02 (2NC)	DP•R11Z02	DP•R13Z02	DP•R31Z02
X12P (1NO+2NC)	DP•R11X12P	DP•R13X12P	DP•R31X12P
X21P (2NO+1NC)	DP•R11X21P	DP•R13X21P	DP•R31X21P
W03P (3NC)	DP•R11W03P	DP•R13W03P	DP•R31W03P

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

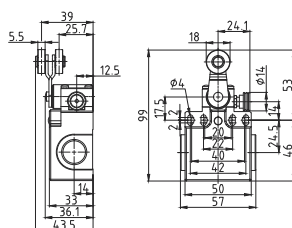
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

### R38 Steel plunger with nylon roller with reset



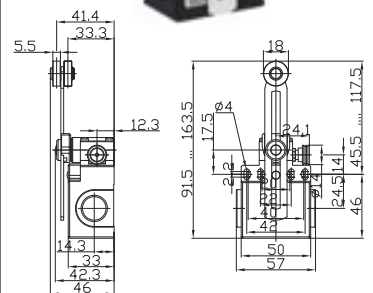
Min. actuating force      **7 N (24N ⊖)**  
 Weight                      **125 g**  
 Operating diagram        **Page 70**

### R41 Lever with nylon roller with reset



Min. actuating torque    **0,10 Nm (0,32 Nm ⊖)**  
 Weight                      **125 g**  
 Operating diagram        **Page 70**

### R51 Adjustable lever with nylon roller with reset



Min. actuating torque    **0,10 Nm (0,32 Nm ⊖)**  
 Weight                      **125 g**  
 Operating diagram        **Page 70**

### Contact Blocks

Z11 (1NO+1NC)	DP•R38Z11	DP•R41Z11	DP•R51Z11
X11 (1NO+1NC)	DP•R38X11	DP•R41X11	DP•R51X11
Y11 (1NO+1NC)	DP•R38Y11	DP•R41Y11	DP•R51Y11
W02 (2NC)	DP•R38W02	DP•R41W02	DP•R51W02
Z02 (2NC)	DP•R38Z02	DP•R41Z02	DP•R51Z02
X12P (1NO+2NC)	DP•R38X12P	DP•R41X12P	DP•R51X12P
X21P (2NO+1NC)	DP•R38X21P	DP•R41X21P	DP•R51X21P
W03P (3NC)	DP•R38W03P	DP•R41W03P	DP•R51W03P

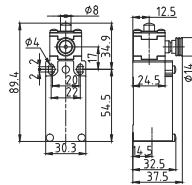
## Metal casing. Polymer head. 30 mm width. 1 cable inlet - IP66

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

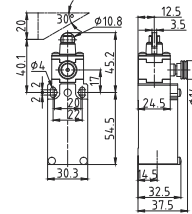
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 7: M12 5 poles connector
- 8: M12 8 poles connector

### R11 Steel plunger with reset



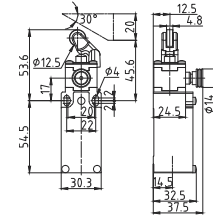
Min. actuating force	15 N (30N ⊖)
Weight	185 g
Operating diagram	Page 70

### R13 Steel plunger with nylon roller with reset



Min. actuating force	12 N (30N ⊖)
Weight	185 g
Operating diagram	Page 70

### R31 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	190 g
Operating diagram	Page 70

### Contact Blocks

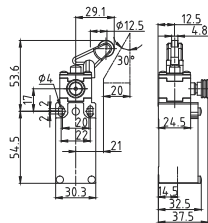
Z11 (1NO+1NC)	AM•R11Z11	AM•R13Z11	AM•R31Z11
X11 (1NO+1NC)	AM•R11X11	AM•R13X11	AM•R31X11
Y11 (1NO+1NC)	AM•R11Y11	AM•R13Y11	AM•R31Y11
W02 (2NC)	AM•R11W02	AM•R13W02	AM•R31W02
Z02 (2NC)	AM•R11Z02	AM•R13Z02	AM•R31Z02
X12P (1NO+2NC)	AM•R11X12P	AM•R13X12P	AM•R31X12P
X21P (2NO+1NC)	AM•R11X21P	AM•R13X21P	AM•R31X21P
W03P (3NC)	AM•R11W03P	AM•R13W03P	AM•R31W03P

### Electrical connection:

Replace the symbol “•” with the number of the thread desired

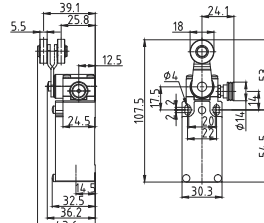
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5
- 7: M12 5 poles connector
- 8: M12 8 poles connector

### R32 Steel plunger with nylon roller with reset



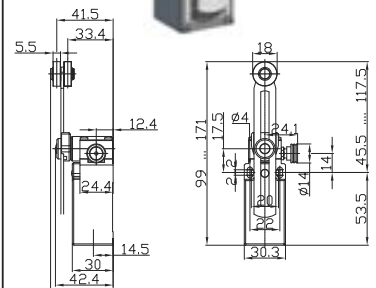
Min. actuating force	7 N (24N ⊖)
Weight	190 g
Operating diagram	Page 70

### R41 Lever with nylon roller with reset



Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	190 g
Operating diagram	Page 70

### R51 Adjustable lever with nylon roller with reset



Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	190 g
Operating diagram	Page 70

### Contact Blocks

Z11 (1NO+1NC)	AM•R32Z11	AM•R41Z11	AM•R51Z11
X11 (1NO+1NC)	AM•R32X11	AM•R41X11	AM•R51X11
Y11 (1NO+1NC)	AM•R32Y11	AM•R41Y11	AM•R51Y11
W02 (2NC)	AM•R32W02	AM•R41W02	AM•R51W02
Z02 (2NC)	AM•R32Z02	AM•R41Z02	AM•R51Z02
X12P (1NO+2NC)	AM•R32X12P	AM•R41X12P	AM•R51X12P
X21P (2NO+1NC)	AM•R32X21P	AM•R41X21P	AM•R51X21P
W03P (3NC)	AM•R32W03P	AM•R41W03P	AM•R51W03P

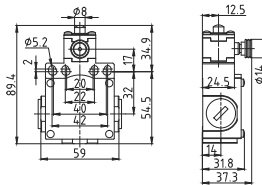
## Metal casing. Polymer head. 50 mm width. 3 cable inlets - IP66

### Electrical connection:

Replace the symbol "•" with the number of the thread desired

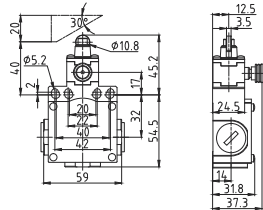
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

### R11 Steel plunger with reset



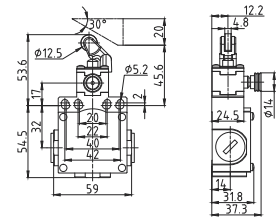
Min. actuating force	15 N (30N ⊖)
Weight	245 g
Operating diagram	Page 70

### R13 Steel plunger with nylon roller with reset



Min. actuating force	12 N (30N ⊖)
Weight	245 g
Operating diagram	Page 70

### R31 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	250 g
Operating diagram	Page 70

### Contact Blocks

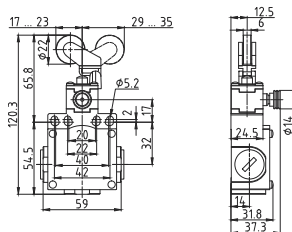
Z11 (1NO+1NC)	DM•R11Z11	DM•R13Z11	DM•R31Z11
X11 (1NO+1NC)	DM•R11X11	DM•R13X11	DM•R31X11
Y11 (1NO+1NC)	DM•R11Y11	DM•R13Y11	DM•R31Y11
W02 (2NC)	DM•R11W02	DM•R13W02	DM•R31W02
Z02 (2NC)	DM•R11Z02	DM•R13Z02	DM•R31Z02
X12P (1NO+2NC)	DM•R11X12P	DM•R13X12P	DM•R31X12P
X21P (2NO+1NC)	DM•R11X21P	DM•R13X21P	DM•R31X21P
W03P (3NC)	DM•R11W03P	DM•R13W03P	DM•R31W03P

### Electrical connection:

Replace the symbol "•" with the number of the thread desired

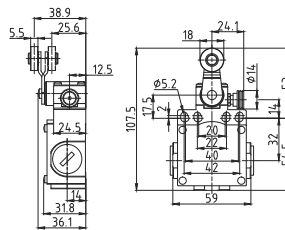
- 1: Cable gland PG 13.5
- 2: Cable gland 1/2" NPT (with adapter)
- 3: Cable gland PG 11
- 4: Cable gland M16 x 1,5
- 5: Cable gland M20 x 1,5

### R38 Steel plunger with nylon roller with reset



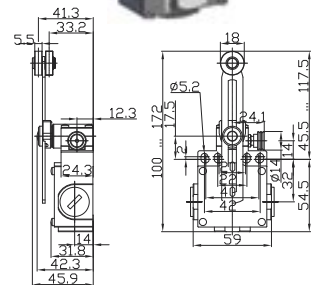
Min. actuating force	7 N (24N ⊖)
Weight	250 g
Operating diagram	Page 70

### R41 Lever with nylon roller with reset



Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	250 g
Operating diagram	Page 70

### R51 Adjustable lever with nylon roller with reset



Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	250 g
Operating diagram	Page 70

### Contact Blocks

Z11 (1NO+1NC)	DM•R38Z11	DM•R41Z11	DM•R51Z11
X11 (1NO+1NC)	DM•R38X11	DM•R41X11	DM•R51X11
Y11 (1NO+1NC)	DM•R38Y11	DM•R41Y11	DM•R51Y11
W02 (2NC)	DM•R38W02	DM•R41W02	DM•R51W02
Z02 (2NC)	DM•R38Z02	DM•R41Z02	DM•R51Z02
X12P (1NO+2NC)	DM•R38X12P	DM•R41X12P	DM•R51X12P
X21P (2NO+1NC)	DM•R38X21P	DM•R41X21P	DM•R51X21P
W03P (3NC)	DM•R38W03P	DM•R41W03P	DM•R51W03P

## General Technical Data, Specifications, Directives and Standards

The **Cometpi** products listed in this catalogue are developed and manufactured according to the rules set out in IEC international publications and EN European standard.

### Specifications

#### • International Specifications

The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.

#### • European Specifications

The European Committee for Electrotechnical Standardisation (CENELEC) publishes EN standards for low voltage industrial apparatus.

These European standards differ very little from IEC international standards and use a similar numbering system. The same is true of national standards. Contradicting national standards are withdrawn.

#### • Harmonised European Specifications

The European Committees for Standardisation (CEN and CENELEC) publish EN standards relating to safety of machinery.

#### • Specifications in Canada and the USA

These are equivalent, but differ markedly from IEC, UTE, VDE and BS specifications.

**UL** Underwriters Laboratories (USA)


**CSA** Canadian Standards Association (Canada)

Remark concerning the label issued by the UL (USA). Two levels of acceptance between devices must be distinguished.

**“Recognized”** Authorised to be included in equipment, if the equipment in question has been entirely mounted and wired by qualified personnel. They are not valid for use as “General purpose products” as their possibilities are limited.

They bear the mark: 

**“Listed”** Authorised to be included in equipment and for separate sale are “General purpose products” components in the USA.

They bear the mark: 

### European Directives

The guarantee of free movement of goods within the European Community assumes elimination of any regulatory differences between the member states. European Directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

There are three main directives:

#### • Low Voltage Directive 2014/35/UE concerning electrical equipment from 50 to 1000 V a.c. and from 75 to 1500 V d.c.

This specifies that compliance with the requirements that it sets out **is acquired** once the equipment conforms to the standards harmonised at European level: EN 60947-1 and EN-60947-5-1 for **limit switches**.

#### • Machines Directives - 2006/42/CE defining main safety and health requirements concerning design and manufacture of the machines and other equipment including safety components in European Union countries.

#### • Electro magnetic Compatibility Directive 2014/30/UE concerning all electrical devices likely to create electromagnetic disturbances.

### Signification of CE marking:

**CE marking** must not be confused with a quality label.

**CE marking** placed on a product is proof of conformity with the European Directives concerning the product.

**CE marking** is part of an administrative procedure and guarantees free movement of the product within the European Community.

### Standards

#### • International Standards

**IEC 60947-1** Low-voltage switchgear and controlgear - Part 1: General Rules (CEI EN 60947-1).

**IEC 60947-5-1** Low-voltage switchgear and controlgear - Part 5: Control circuit devices and switching elements - Section 1: Electromechanical control circuit devices (CEI EN 60947-5-1) - Chapter 3: Special requirements for control switches with positive opening operation.

**IEC 60204-1** Electrical equipment on industrial machines - Part 1: General requirements (CEI EN 60204-1).

**IEC 60204-2** Electrical equipment on industrial machines - Part 2: Item designation and examples of drawings, diagrams, tables and instructions.

**IEC 60529** Degrees of protection provided by enclosure (IP code) (CEI EN 60529).

#### • European Standards

**EN 50041** Low-voltage switchgear and controlgear for industrial use. Controlswitches. Position switches 42,5 x 80. Dimensions and characteristics.

**EN 50047** Low-voltage switchgear and controlgear for industrial use. Control switches. Position switches 30 x 55. Dimensions and characteristics.

**EN 60947-1** Low-voltage switchgear and controlgear - Part 1: General rules.

**EN 60947-5-1** Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit device

**EN 60947-5-5** Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function.

#### • American Standards

**UL 508** Standard for Industrial Control Equipment

**C22.2 NO. 14-13** Industrial control equipment.

#### • Chinese Standards

**GB 14048.5** Low-voltage switchgear and controlgear - Part 5: Control circuit devices and switching elements.



## General Technical Data, Specifications, Directives and Standards

### Double Insulation

Class II materials, according to IEC 536, are designed with double insulation. This measure consists in doubling the functional insulation with an additional layer of insulation so as to eliminate the risk of electric shock and thus not having to protect elsewhere. No conductive part of "double insulated" material should be connected to a protective conductor.

### Positive Opening Operation

A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between the moving contacts and the point of the actuator to which the actuating force is applied.

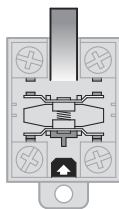
The positive opening operation does not deal with N.O. contacts.

Control switches with positive opening operation may be provided with either snap action or slow action contact elements. To use several contacts on the same control switch with positive opening operation, they must be electrically separated from each other, if not, only one may be used.

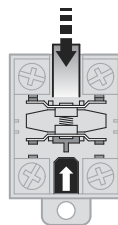
Every control switch with positive opening operation must be indelibly marked on the outside with the symbol: .

### Snap Action

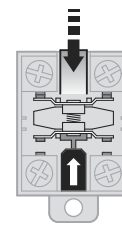
Snap action contacts are characterised by a release position that is distinct from the operating position (differential travel). Snap breaking of moving contacts is independent of the switch actuator's speed and contributes to regular electric performance even for slow switch actuator speeds.



State of rest



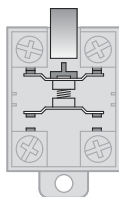
Contact change



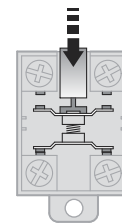
Positive opening

### Slow Action

Slow action contacts are characterised by a release position that is the same as the operating position. The switch actuator's speed directly conditions the travel speed of contacts.



State of rest



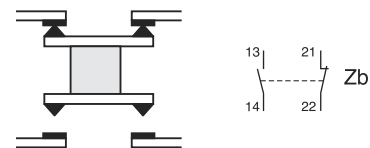
Completely closed

### Contact shape according to IEC 947-5-1.

Change-over contact elements with 4 terminals must be indelibly marked with the corresponding Za or Zb symbol as in the diagrams below.



Contacts with the same polarity



The 2 moving contacts are electrically separated

### Utilization Category

AC-15: switching of electromagnetic loads of electromagnets using an alternating current (>72 VA).

DC-13: switching of electromagnets using a direct current.

### Terminals

Limit switches with metal casings must have a terminal, for a protective conductor, that is placed inside the casing very close to the cable inlet and must be indelibly marked.

### Minimum Actuation Force/Torque

The minimum amount of force/torque that is to be applied to the switch actuator to produce a change in contact position.

### Minimum Force/Torque to achieve Positive Opening Operation

The minimum amount of force/torque that is to be applied to the switch actuator to ensure positive opening operation of the N.C. contact.



## Plastic or Metal Casing - Travel and Operation Diagrams

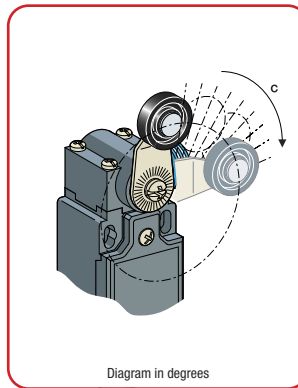
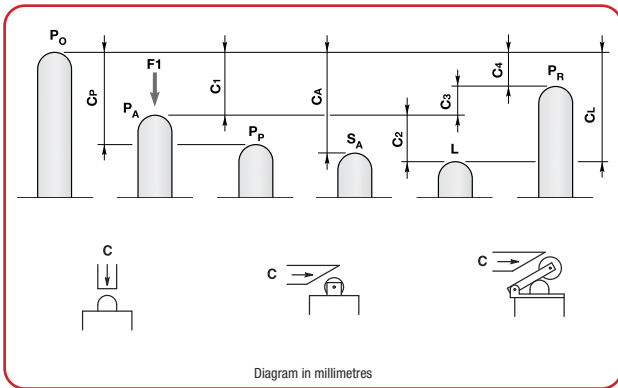


Diagram for snap action contacts:

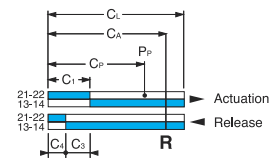
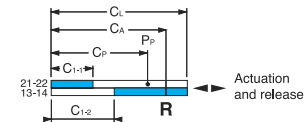


Diagram for non-overlapping slow action contacts:



**P<sub>0</sub> Free position:** position of the switch actuator when no external force is exerted on it.

**P<sub>A</sub> Operating position:** position of the switch actuator, under the effect of force F1, when the contacts leave their initial free position.

**P<sub>P</sub> Positive opening position:** position of the switch actuator from which positive opening is ensured.

**S<sub>A</sub> Latching point:** point of no return of the switch actuator beyond which the opened status of the NC contacts is maintained. Unlocking will only occur after deliberate action on the reset button.

**L Max. travel position:** maximum acceptable travel position of the switch actuator.

**P<sub>R</sub> Release position:** position of the switch actuator when the contacts return to their initial free position.

**C<sub>1</sub> Pre-travel:** distance between the free position P<sub>0</sub> and the operating position P<sub>A</sub>.

**C<sub>p</sub> Positive opening travel:** minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact.

**C<sub>A</sub> Latching travel:** distance between the free positions P<sub>0</sub> and the latching point S<sub>A</sub>.

**C<sub>2</sub> Over-travel:** distance between the operating position P<sub>A</sub> and the max. travel position L.

**C<sub>1</sub> Max. travel:** distance between the free position P<sub>0</sub> and the max. travel position L.

**C<sub>3</sub> Differential travel (C<sub>1</sub>-C<sub>4</sub>):** travel difference of the switch actuator between the operating position P<sub>A</sub> and the release position P<sub>R</sub>.

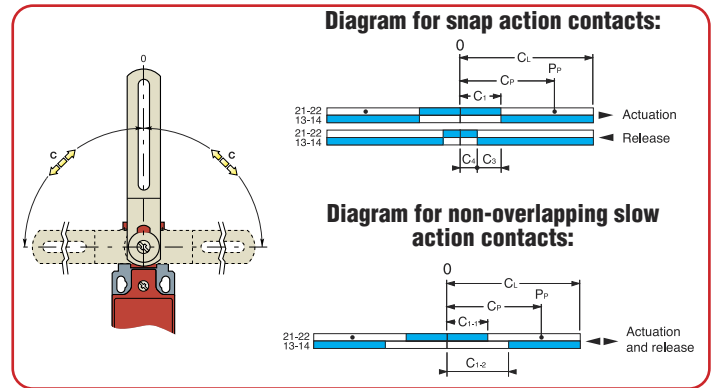
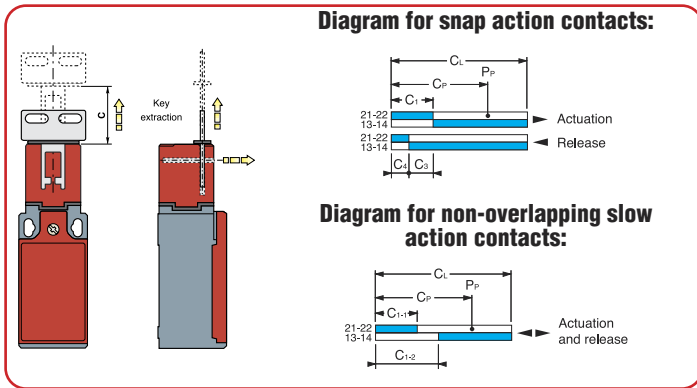
**C<sub>4</sub> Release travel:** distance between the release position P<sub>R</sub> and the free position P<sub>0</sub>.

Note: for slow action contacts, C<sub>3</sub> = 0, C<sub>1-1</sub> = pre-travel of contact 21-22, C<sub>1-2</sub> = pre-travel of contact 13-14

- ▶ Actuation
- ◀ Release
- Contact closed
- Contact opened
- Positive opening operation
- R Latching point S<sub>A</sub>

<b>Z11:</b> Snap action 1NO+1NC						
<b>X11:</b> Slow action break before make 1NO+1NC						
<b>Y11:</b> Slow action make before break 1NO+1NC						
<b>W02:</b> Simultaneous slow action 2NC						
<b>Z02:</b> Snap action 2NC						
<b>X12P:</b> Slow action break before make 1NO+2NC						
<b>X21P:</b> Slow action break before make 2NO+1NC						
<b>W03P:</b> Simultaneous slow action 3NC						

## Plastic or Metal Casing - Travel and Operation Diagrams



**P<sub>0</sub> Free position:** position of the switch actuator when no external force is exerted on it.  
**P<sub>A</sub> Operating position:** position of the switch actuator, under the effect of force F<sub>1</sub>, when the contacts leave their initial free position.  
**P<sub>P</sub> Positive opening position:** position of the switch actuator from which positive opening is ensured.  
**L Max. travel position:** maximum acceptable travel position of the switch actuator under the effect of a force F<sub>1</sub>.  
**P<sub>R</sub> Release position:** position of the switch actuator when the contacts return to their initial free position.  
**C<sub>1</sub> Pre-travel:** distance between the free position P<sub>0</sub>

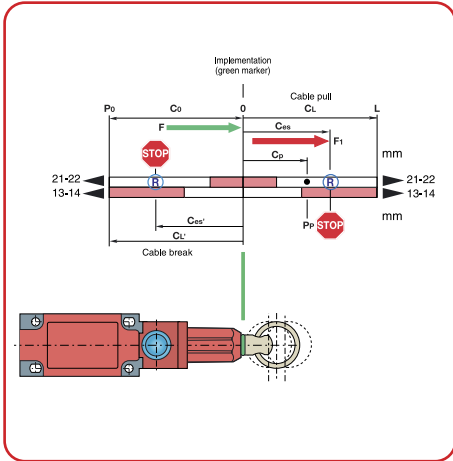
and the operating position P<sub>A</sub>.  
**C<sub>P</sub> Positive opening travel:** minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact.  
**C<sub>2</sub> Over-travel:** distance between the operating position P<sub>A</sub> and the max. travel position L.  
**C<sub>L</sub> Max. travel:** distance between the free position P<sub>0</sub> and the max. travel position L.  
**C<sub>3</sub> Differential travel (C<sub>1</sub>-C<sub>4</sub>):** travel difference of the switch actuator between the operating position P<sub>A</sub> and the release position P<sub>R</sub>.  
**C<sub>4</sub> Release travel:** distance between the release position P<sub>R</sub> and the free position P<sub>0</sub>.

Note: for slow action contacts, C<sub>3</sub> = 0, C<sub>1-2</sub> = pre-travel of contact 21-22, C<sub>1-2</sub> = pre-travel of contact 13-14

- ▶ Actuation
- ◀ Release
- Contact closed
- Contact opened
- Positive opening operation

<b>Z11:</b> Snap action 1NO+1NC						
<b>X11:</b> Slow action break before make 1NO+1NC						
<b>Y11:</b> Slow action make before break 1NO+1NC						
<b>W02:</b> Simultaneous slow action 2NC						
<b>Z02:</b> Snap action 2NC						
<b>X12P:</b> Slow action break before make 1NO+2NC						
<b>X21P:</b> Slow action break before make 2NO+1NC						
<b>W03P:</b> Simultaneous slow action 3NC						

## Plastic or Metal Casing - Travel and Operation Diagrams



**$P_0$  Free position:** position of the switch actuator when no external force is exerted on it.

**O Starting position:** position of the switch actuator, under the effect of force  $F_1$ .

**$P_p$  Positive opening position:** position of the switch actuator from which positive opening is ensured.

**L Max. travel position:** maximum acceptable travel position of the switch actuator.

**$C_0$  Ideal travel for pre-tensioning:** distance between the free position  $P_0$  and the starting position O.

**$C_p$  Positive opening travel:** minimum travel of the switch actuator, from the starting position O, to ensure positive opening operation of the normally closed contact.

**$C_{ES}$ ,  $C_{ES}'$  Travel for emergency stop and latching point.**

**$C_L$  Max. travel:** distance between the starting position O and the max. travel position L.

**$C_L'$  Travel between pre-tensioning position  $C_0$  and free position  $P_0$  in case of rope cut.**

- ▶ Actuation
- ◀ Release
- Contact closed
- Contact opened
- Positive opening operation
- R Latching point  $S_A$

		<b>K96</b> Pull wire without reset for simple stop	<b>K9000</b> Pull wire without reset for simple stop	<b>K9300</b> Pull wire with reset for emergency stop	<b>K9800</b> Pull wire with reset for emergency stop	<b>K9200</b> Pull wire with reset for emergency stop
<b>X11:</b> Slow action break before make 1NO+1NC						
<b>W02:</b> Simultaneous slow action 2NC						
<b>X12P:</b> Slow action break before make 1NO+2NC						
<b>X21P:</b> Slow action break before make 2NO+1NC						
<b>W03P:</b> Simultaneous slow action 3NC						

		<b>K97</b> Pull wire without reset for simple stop	<b>K9100</b> Pull wire without reset for simple stop	<b>K9500</b> Pull wire with reset for emergency stop	<b>K9900</b> Pull wire with reset for emergency stop	<b>K9400</b> Pull wire with reset for emergency stop
<b>X11:</b> Slow action break before make 1NO+1NC						
<b>W02:</b> Simultaneous slow action 2NC						
<b>X12:</b> Slow action break before make 1NO+2NC						
<b>X21:</b> Slow action break before make 2NO+1NC						
<b>W03:</b> Simultaneous slow action 3NC						

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