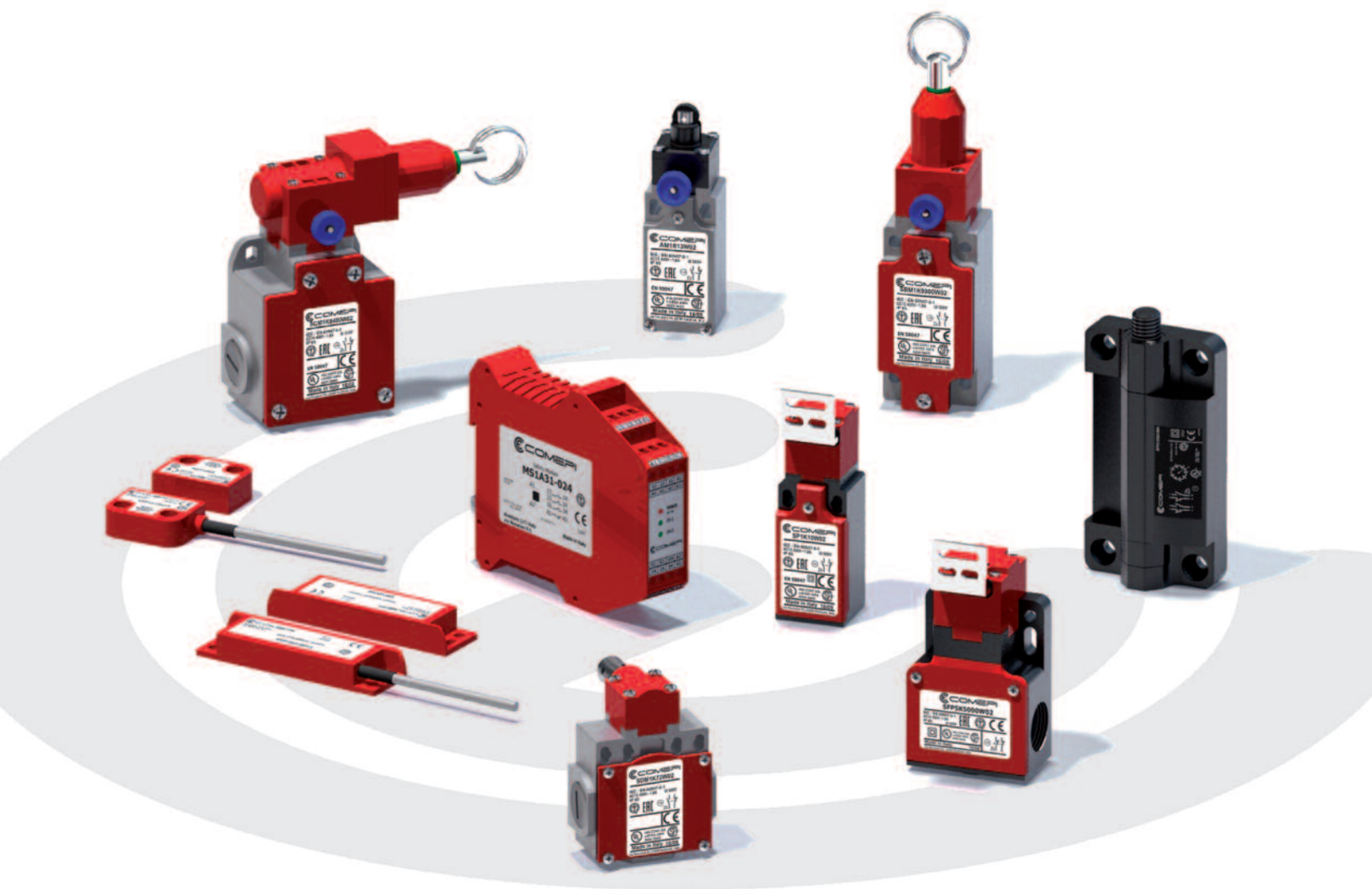
COMEPI

SAFETY DEVICES



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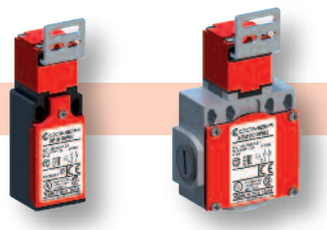
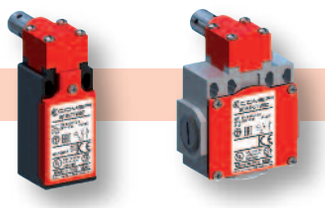
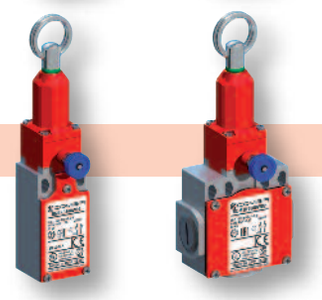


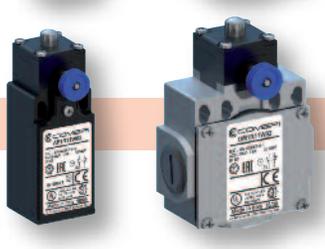
Safety Limit Switches with separate actuator page 4



Hinge mount Safety Limit Switches page 12



Safety Limit Switches with rope page 18



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Safety Limit Switches with separate actuator

3 Bent key | 4 Flat key | 5 Bent key | 6 Flat key | 7 Shock absorbing bent key | 8 Shock absorbing flat key | 9 Adjustable joint key

Z02: Snap action 2NC — Y+Y

Z11: Snap action 1NO+1NC — Zb

W02: Simultaneous slow action 2NC — Y+Y

X11: Slow action break before make 1NO+1NC — Zb

Y11: Slow action make before break 1NO+1NC — Zb

X12P: Slow action break before make 1NO+2NC — Y+Y+X

X21P: Slow action break before make 2NO+1NC — Y+X+X

W03P: Simultaneous slow action 3NC — Y+Y+Y

SP_K series (Plastic)

SDP_K series (Plastic)

SM_K series (Metal)

SDM_K series (Metal)

45 Bent key | 46 Flat key | 49 Adjustable joint key

X12: Slow action break before make 1NO+2NC — Y+Y+X

X21: Slow action break before make 2NO+1NC — Y+X+X

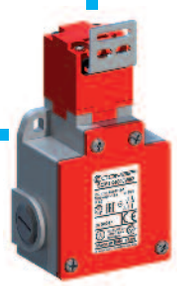
W03: Simultaneous slow action 3NC — Y+Y+Y

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

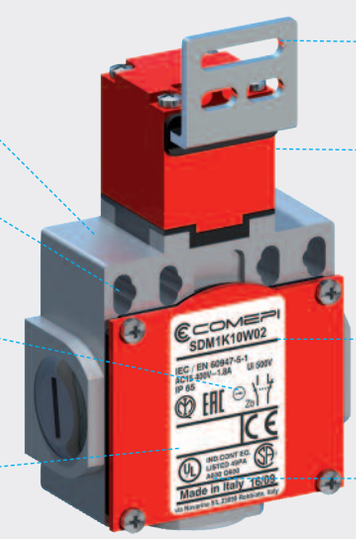
Safety limit switches with small latch (key) of SP/SDP/SBP/SFP series are made of fibre-glass reinforced UL-V0 thermoplastic material, and they offer double insulation ⧈ and a degree of protection IP65. Safety limit switches of SM/SDM series are made of zinc alloy (zamack) and have a degree of protection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

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

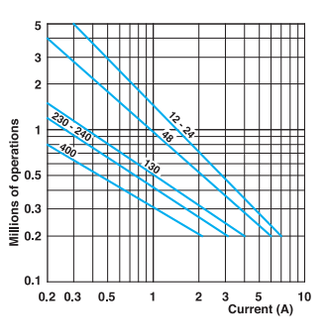
Safety Limit Switches with separate actuator - Technical Data

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

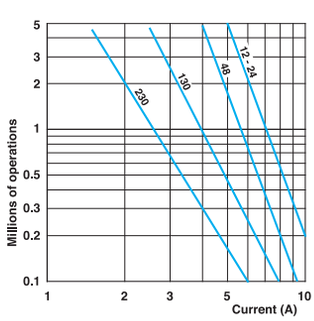
Electrical Data

Rated insulation voltage U_i - 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 X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for SM/SDM series and contacts type X12P, X21P, W03P)
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)		kV	6 (4 kV for contacts type X12P, X21P, W03P)
Conventional free air thermal current I_{th} (according to IEC 60947-5-1) $\theta < 40$ °C		A	10
Short-circuit protection U_e < 500 V a.c. - gG (gl) type fuses		A	10
Rated operational current			
I_e / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz	A	10
	120 V - 50/60 Hz	A	6
	400 V - 50/60 Hz	A	4
I_e / DC-13 (according to IEC 60947-5-1)	24 V - d.c.	A	2.8
	125 V - d.c.	A	0.55
	250 V - d.c.	A	0.27
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mΩ	25
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)
Terminal for protective conductor			– / M3.5 (+, –) pozidriv 2 screw with cable clamp
Connecting capacity		1 or 2 x mm²	0.75 ... 2.5 (0.34... 1.5 for 3 poles contacts type)
Terminal marking			According to IEC 60947-5-1
Mechanical durability			1 million of operations
Electrical durability (according to IEC 60947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)
B10d = 2.000.000 cycles			

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

• **Ordering details** ..... page 8 - 11
• **Additional Technical Data** ..... page 53

Safety Limit Switches with separate actuator - Technical Data

Technical data approved by IMQ

Standards		Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards
Degree of protection		IP 65 (SP/SDP/SBP series), IP 66 (SM/SDM/SBM/SCM series)

Contact blocks type Z11, X11, Y11, W02 and Z02

Rated insulation voltage U_i		500 V (degree of pollution 3)
Rated impulse withstand voltage U_{imp}		6 kV
Conventional free air thermal current I_{th}		10 A
Short-circuit protection - gG (gl) type fuses		10 A
Rated operational current		
I_e / AC-15	24 V - 50/60 Hz	10 A
	400 V - 50/60 Hz	1.8 A
I_e / DC-13	24 V - d.c.	2.8 A
	125 V - d.c.	0.55 A
	250 V - d.c.	0.27 A

Technical data approved by UL

Standards	Devices conform with UL 508

Contact blocks type Z11, X11, Y11, W02 and Z02

Utilization categories	A600, Q600 (A300, Q300 when installed in SM/SDM series)

Contact blocks type X12P, X21P and W03P

Utilization categories	A300, Q300

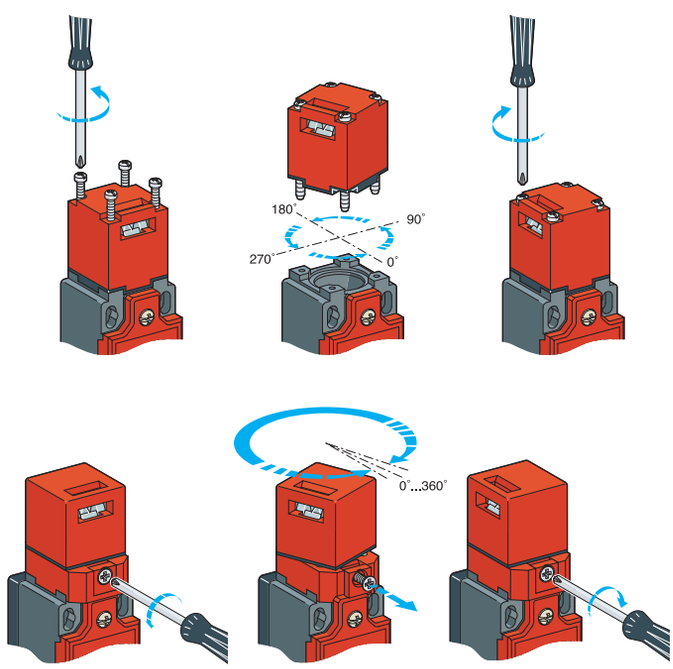
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.

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

Implementation

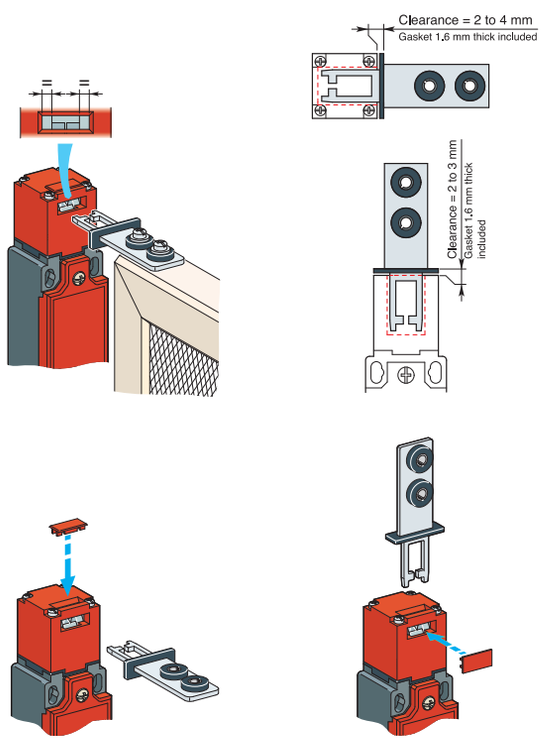
Operating head orientation

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



Recommended tightening torque 0,3 Nm (max 0,5 Nm).

Key adjustment

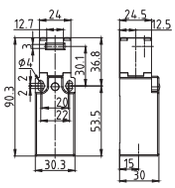


Polymeric casing - IP65

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

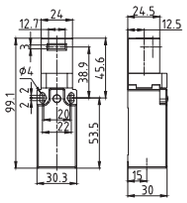
Operating keys to be ordered separately (see page 11)

K10 Adjustable head 90° (replaces K20)



Min. actuating force	**15 N (30N ⊖)**
Weight	**80 g**
Operating diagram	**Page 53**

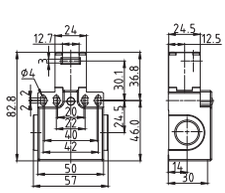
K80 Fully turnable (replaces K120)



Min. actuating force	**15 N (30N ⊖)**
Weight	**90 g**
Operating diagram	**Page 53**

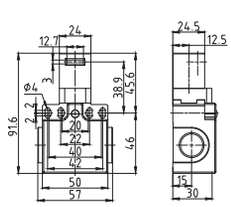
Contact Blocks			
Z11	(1NO+1NC)	SP•K10Z11	SP•K80Z11
X11	(1NO+1NC)	SP•K10X11	SP•K80X11
Y11	(1NO+1NC)	SP•K10Y11	SP•K80Y11
W02	(2NC)	SP•K10W02	SP•K80W02
Z02	(2NC)	SP•K10Z02	SP•K80Z02
X12P	(1NO+2NC)	SP•K10X12P	SP•K80X12P
X21P	(2NO+1NC)	SP•K10X21P	SP•K80X21P
W03P	(3NC)	SP•K10W03P	SP•K80W03P

K10 Adjustable head 90° (replaces K20)



Min. actuating force	**15 N (30N ⊖)**
Weight	**110 g**
Operating diagram	**Page 53**

K80 Fully turnable (replaces K120)



Min. actuating force	**15 N (30N ⊖)**
Weight	**120 g**
Operating diagram	**Page 53**

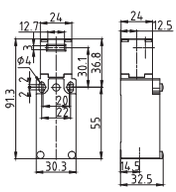
Contact Blocks			
Z11	(1NO+1NC)	SDP•K10Z11	SDP•K80Z11
X11	(1NO+1NC)	SDP•K10X11	SDP•K80X11
Y11	(1NO+1NC)	SDP•K10Y11	SDP•K80Y11
W02	(2NC)	SDP•K10W02	SDP•K80W02
Z02	(2NC)	SDP•K10Z02	SDP•K80Z02
X12P	(1NO+2NC)	SDP•K10X12P	SDP•K80X12P
X21P	(2NO+1NC)	SDP•K10X21P	SDP•K80X21P
W03P	(3NC)	SDP•K10W03P	SDP•K80W03P

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
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

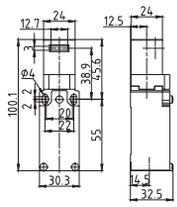
Operating keys to be ordered separately (see page 11)

K10 Adjustable head 90° (replaces K20)



Min. actuating force	**15 N (30N ⊖)**
Weight	**175 g**
Operating diagram	**Page 53**

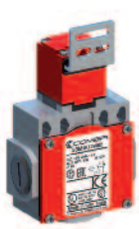
K80 Fully turnable (replaces K120)

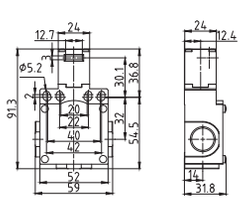


Min. actuating force	**15 N (30N ⊖)**
Weight	**185 g**
Operating diagram	**Page 53**

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

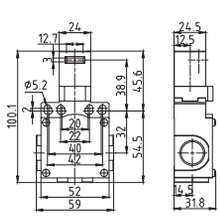
K10 Adjustable head 90° (replaces K20)





Min. actuating force	**15 N (30N ⊖)**
Weight	**235 g**
Operating diagram	**Page 53**

K80 Fully turnable (replaces K120)



Min. actuating force	**15 N (30N ⊖)**
Weight	**245 g**
Operating diagram	**Page 53**

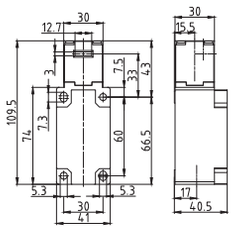
Contact Blocks			
Z11	(1NO+1NC)	SDM•K10Z11	SDM•K80Z11
X11	(1NO+1NC)	SDM•K10X11	SDM•K80X11
Y11	(1NO+1NC)	SDM•K10Y11	SDM•K80Y11
W02	(2NC)	SDM•K10W02	SDM•K80W02
Z02	(2NC)	SDM•K10Z02	SDM•K80Z02
X12P	(1NO+2NC)	SDM•K10X12P	SDM•K80X12P
X21P	(2NO+1NC)	SDM•K10X21P	SDM•K80X21P
W03P	(3NC)	SDM•K10W03P	SDM•K80W03P

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

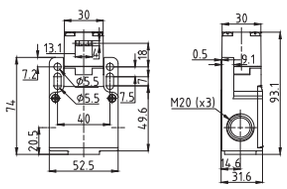
Operating keys to be ordered separately (see page 11)

K3000 Adjustable head 90°



Min. actuating force	**15 N (30N ⊖)**
Weight	**155 g**
Operating diagram	**Page 53**

K5000 Adjustable head 90°

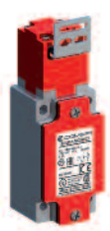


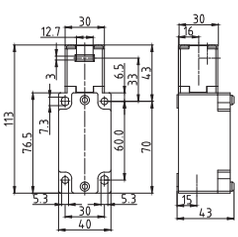
Initial minimum activating force	**60 N (90N ⊖)**
Weight	**140 g**
Operating diagram	**Page**

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

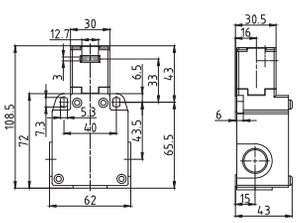
K4000 Adjustable head 90°





Min. actuating force	**15 N (30N ⊖)**
Weight	**225 g**
Operating diagram	**Page 53**

K4000 Adjustable head 90°



Min. actuating force	**15 N (30N ⊖)**
Weight	**220 g**
Operating diagram	**Page 53**

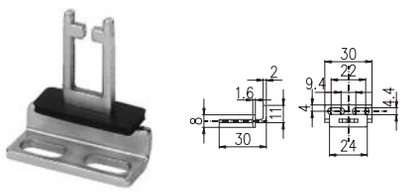
Contact Blocks

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

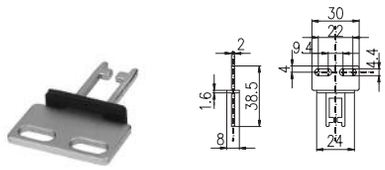
Operating keys (to be ordered separately)

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

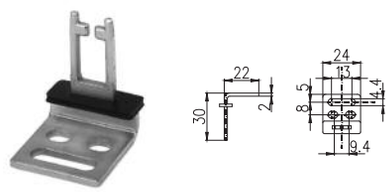
Order code 3: Bent key



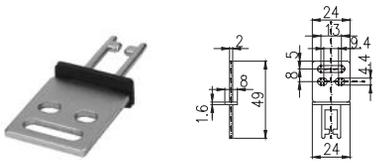
Order code 4: Flat key



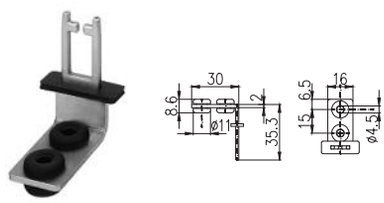
Order code 5: Bent key



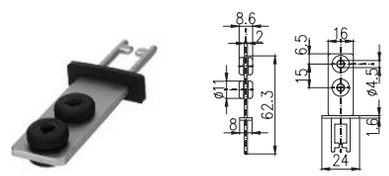
Order code 6: Flat key



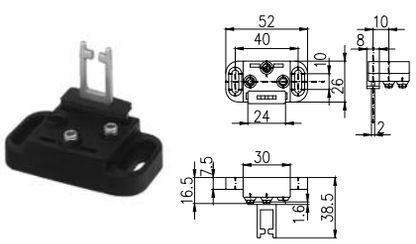
Order code 7: Shock absorbing bent key



Order code 8: Shock absorbing flat key

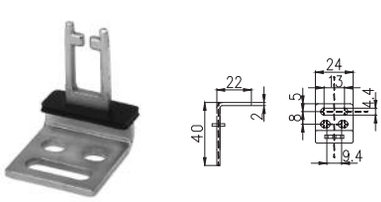


Order code 9: Adjustable joint key

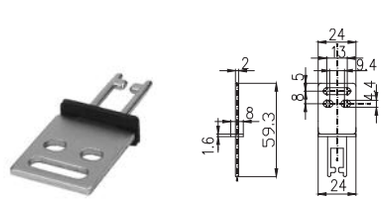


For operating head models K3000, K4000, K5000 (dimensions in mm.)

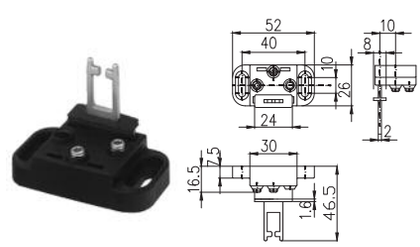
Order code 45: Bent key



Order code 46: Flat key

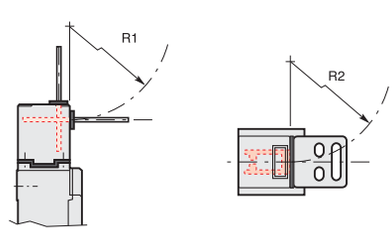


Order code 49: Adjustable joint key

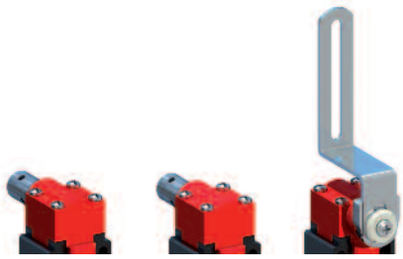


Minimum values [mm]

	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



Hinge mount Safety Limit Switches



K71 Zinc plated steel shaft

K72 Stainless steel shaft

K61 Zinc plated steel lever

Z02: Snap action 2NC — Y+Y

Z11: Snap action 1NO+1NC — Zb

W02: Simultaneous slow action 2NC — Y+Y

X11: Slow action break before make 1NO+1NC — Zb

Y11: Slow action make before break 1NO+1NC — Zb

X12P: Slow action break before make 1NO+2NC — Y+Y+X

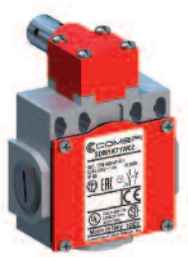
X21P: Slow action break before make 2NO+1NC — Y+X+X

W03P: Simultaneous slow action 3NC — Y+Y+Y

SP_K series (Plastic)

SDP_K series (Plastic)

SM_K series (Metal)



SDM_K series (Metal)

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

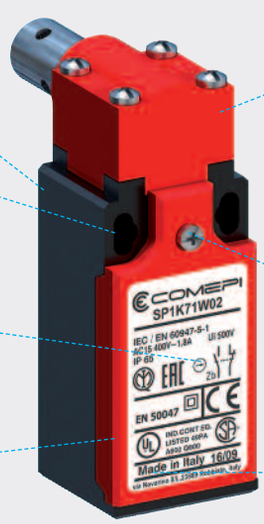
Safety limit switches of SP/SDP series are made of fibre-glass reinforced UL-V0 thermoplastic material, and the offer double insulation ⧈ and a degree of protection IP65. Safety limit switches of SM/SDM series are made of zinc alloy (zamack) and have a degree of protection IP66. They are equipped with 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

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).

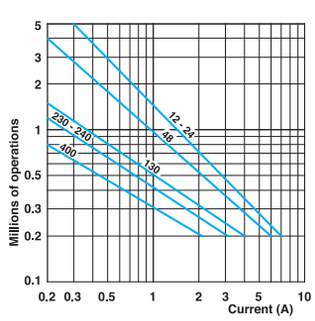
Hinge mount Safety Limit Switches - Technical Data

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

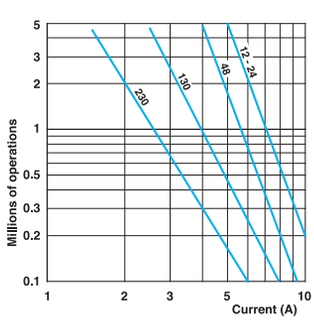
Electrical Data

Rated insulation voltage U_i - 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 X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for SM/SDM series and contacts type X12P, X21P, W03P)	
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)		kV	6 (4 kV for contacts type X12P, X21P, W03P)	
Conventional free air thermal current I_{th} (according to IEC 60947-5-1) $\theta < 40$ °C		A	10	
Short-circuit protection U_e < 500 V a.c. - gG (gl) type fuses		A	10	
Rated operational current				
I_e / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz	A	10	
	120 V - 50/60 Hz	A	6	
	400 V - 50/60 Hz	A	4	
I_e / DC-13 (according to IEC 60947-5-1)	24 V - d.c.	A	2.8	
	125 V - d.c.	A	0.55	
	250 V - d.c.	A	0.27	
Switching frequency		Cycles/h	3600	
Load factor			0.5	
Resistance between contacts		mΩ	25	
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)	
Terminal for protective conductor			–	M3.5 (+, –) pozidriv 2 screw with cable clamp
Connecting capacity		1 or 2 x mm²	0.75 ... 2.5 (0.34... 1.5 for 3 poles contacts type)	
Terminal marking			According to IEC 60947-5-1	
Mechanical durability			1 million of operations	
Electrical durability (according to IEC 60947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)	
B10d = 2.000.000 cycles				

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

• **Ordering details** ..... page 16 - 17
• **Additional Technical Data** ..... page 53

Hinge mount Safety Limit Switches - Technical Data

Technical data approved by IMQ

Standards		Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards
Degree of protection		IP 65 (SP/SDP series) , IP 66 (SM/SDM series)

Contact blocks type Z11, X11, Y11, W02 and Z02

Rated insulation voltage U_i		500 V (degree of pollution 3)
Rated impulse withstand voltage U_{imp}		6 kV
Conventional free air thermal current I_{th}		10 A
Short-circuit protection - gG (gl) type fuses		10 A
Rated operational current		
I_e / AC-15	24 V - 50/60 Hz	10 A
	400 V - 50/60 Hz	1.8 A
I_e / DC-13	24 V - d.c.	2.8 A
	125 V - d.c.	0.55 A
	250 V - d.c.	0.27 A

Technical data approved by UL

Standards	Devices conform with UL 508

Contact blocks type Z11, X11, Y11, W02 and Z02

Utilization categories	A600, Q600
	(A300, Q300 when installed in SM/SDM series)

Contact blocks type X12P, X21P and W03P

Utilization categories	A300, Q300

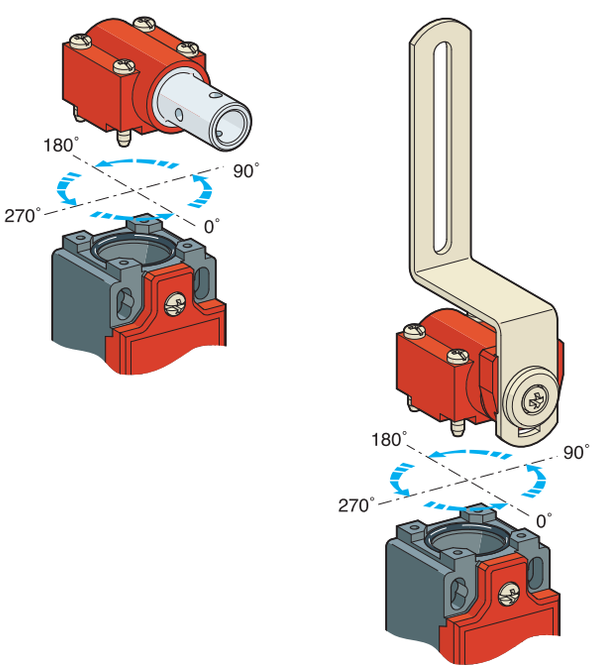
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.

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

Implementation

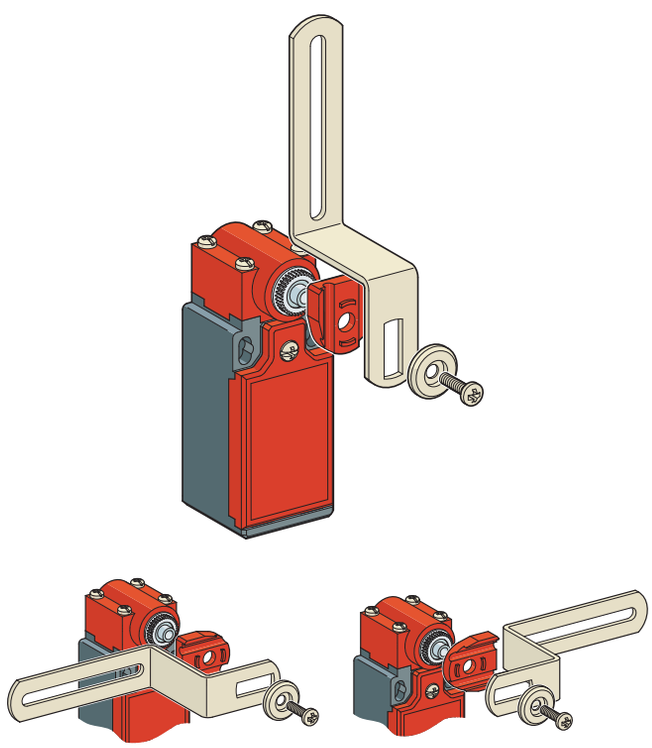
Operating head orientation

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



Lever adjustment

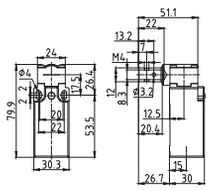
The lever of the head model K61 can ber adjusted every 10° in order to obtain the maximum flexibility on the working plan.
Recommended tightening torque 0,5 Nm (max 0,8 Nm).



Polymeric casing - IP65

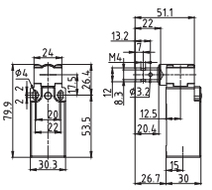
Electrical connection:
Replace the symbol "•" with the number of the thread desired
1: Cable gland PG 13.5
2: Cable gland 1/2" NPT (with adapter)
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

K71 Zinc plated steel shaft



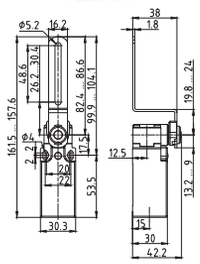
Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	90 g
Operating diagram	Page 53

K72 Stainless steel shaft



Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	90 g
Operating diagram	Page 53

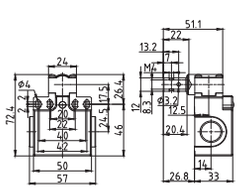
K61 Zinc plated steel lever



Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	110 g
Operating diagram	Page 53

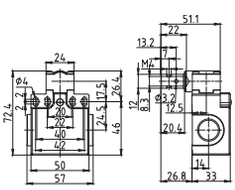
Contact Blocks			
Z11 (1NO+1NC)	SP•K71Z11	SP•K72Z11	SP•K61Z11
X11 (1NO+1NC)	SP•K71X11	SP•K72X11	SP•K61X11
Y11 (1NO+1NC)	SP•K71Y11	SP•K72Y11	SP•K61Y11
W02 (2NC)	SP•K71W02	SP•K72W02	SP•K61W02
Z02 (2NC)	SP•K71Z02	SP•K72Z02	SP•K61Z02
X12P (1NO+2NC)	SP•K71X12P	SP•K72X12P	SP•K61X12P
X21P (2NO+1NC)	SP•K71X21P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

K71 Zinc plated steel shaft



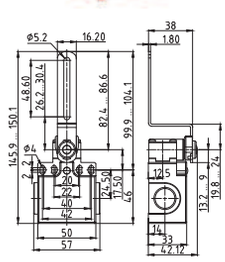
Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	120 g
Operating diagram	Page 53

K72 Stainless steel shaft



Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	120 g
Operating diagram	Page 53

K61 Zinc plated steel lever



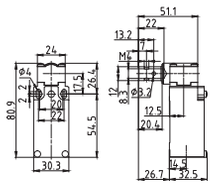
Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	140 g
Operating diagram	Page 53

Contact Blocks			
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

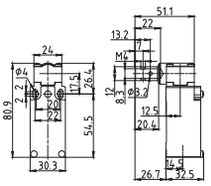
Electrical connection:
Replace the symbol "•" with the number of the thread desired
1: Cable gland PG 13.5
2: Cable gland 1/2" NPT
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

K71 Zinc plated steel shaft



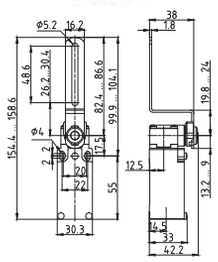
Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	185 g
Operating diagram	Page 53

K72 Stainless steel shaft



Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	185 g
Operating diagram	Page 53

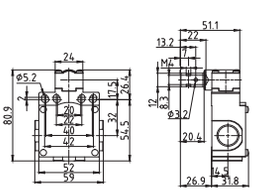
K61 Zinc plated steel lever



Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	205 g
Operating diagram	Page 53

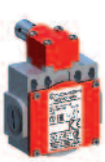
Contact Blocks			
Z11 (1NO+1NC)	SM•K71Z11	SM•K72Z11	SM•K61Z11
X11 (1NO+1NC)	SM•K71X11	SM•K72X11	SM•K61X11
Y11 (1NO+1NC)	SM•K71Y11	SM•K72Y11	SM•K61Y11
W02 (2NC)	SM•K71W02	SM•K72W02	SM•K61W02
Z02 (2NC)	SM•K71Z02	SM•K72Z02	SM•K61Z02
X12P (1NO+2NC)	SM•K71X12P	SM•K72X12P	SM•K61X12P
X21P (2NO+1NC)	SM•K71X21P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

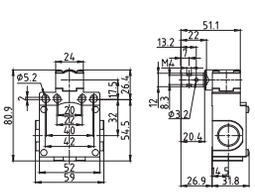
K71 Zinc plated steel shaft



Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	245 g
Operating diagram	Page 53

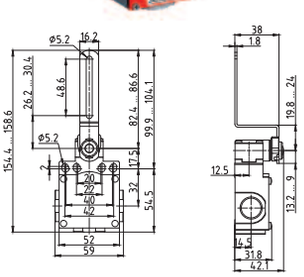
K72 Stainless steel shaft





Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	245 g
Operating diagram	Page 53

K61 Zinc plated steel lever

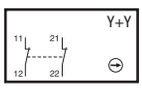


Min. actuating torque	0,12 Nm (0,60 Nm ⊖)
Weight	265 g
Operating diagram	Page 53

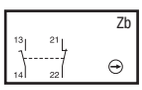
Contact Blocks			
Z11 (1NO+1NC)	SDM•K71Z11	SDM•K72Z11	SDM•K61Z11
X11 (1NO+1NC)	SDM•K71X11	SDM•K72X11	SDM•K61X11
Y11 (1NO+1NC)	SDM•K71Y11	SDM•K72Y11	SDM•K61Y11
W02 (2NC)	SDM•K71W02	SDM•K72W02	SDM•K61W02
Z02 (2NC)	SDM•K71Z02	SDM•K72Z02	SDM•K61Z02
X12P (1NO+2NC)	SDM•K71X12P	SDM•K72X12P	SDM•K61X12P
X21P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

Safety Limit Switches with rope

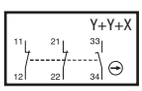
W02: Simultaneous slow action 2NC



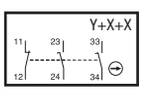
X11: Slow action break before make 1NO+1NC



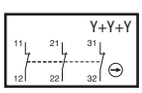
X12P: Slow action break before make 1NO+2NC



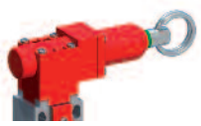
X21P: Slow action break before make 2NO+1NC



W03P: Simultaneous slow action 3NC



K96



K9000

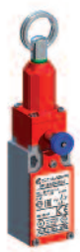
Pull wire without reset for simple stop

K9300

K9800

K9200

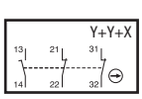
Pull wire with reset for emergency stop



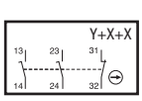
SM_K series (Metal)

SDM_K series (Metal)

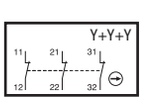
X12: Slow action break before make 1NO+2NC



X21: Slow action break before make 2NO+1NC

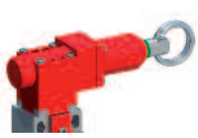


W03: Simultaneous slow action 3NC



Adapter G Type

K97



K9100

Pull wire without reset for simple stop

K9500

K9900

K9400

Pull wire with reset for emergency stop

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 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

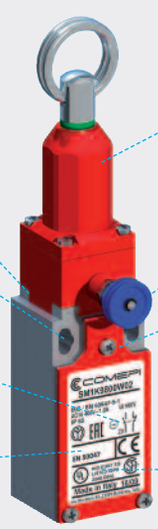
SM/SDM series are made of zinc alloy (zamack). SBM/SCM series are realized in aluminium material, therefore they are mechanically more resistant and three times lighter than the ones in zinc alloy. All metal limit switches have a degree of protection IP66.

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:
- Streight
- 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

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

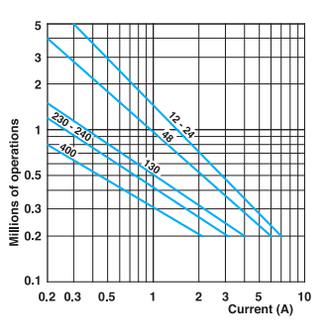
Safety Limit Switches with rope - Technical Data

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

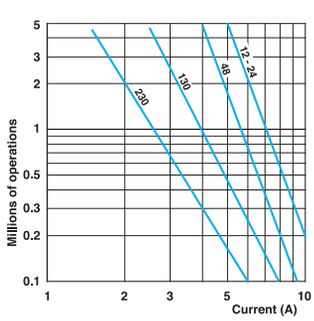
Electrical Data

Rated insulation voltage U_i - 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 X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for SM/SDM series and contacts type X12P, X21P, W03P)
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)		kV	6 (4 kV for contacts type X12P, X21P, W03P)
Conventional free air thermal current I_{th} (according to IEC 60947-5-1) $\theta < 40$ °C		A	10
Short-circuit protection U_e < 500 V a.c. - gG (gl) type fuses		A	10
Rated operational current			
I_e / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz	A	10
	120 V - 50/60 Hz	A	6
	400 V - 50/60 Hz	A	4
I_e / DC-13 (according to IEC 60947-5-1)	24 V - d.c.	A	2.8
	125 V - d.c.	A	0.55
	250 V - d.c.	A	0.27
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mΩ	25
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)
Terminal for protective conductor			M3.5 (+, –) pozidriv 2 screw with cable clamp
Connecting capacity		1 or 2 x mm²	0.75 ... 2.5 (0.34... 1.5 for 3 poles contacts type)
Terminal marking			According to IEC 60947-5-1
Mechanical durability			500.000 operations
Electrical durability (according to IEC 60947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)
B10d = 1.000.000 cycles			

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

• **Ordering details** ..... page 22 - 25
• **Additional Technical Data** ..... page 54

Safety Limit Switches with rope - Technical Data

Technical data approved by IMQ

Standards		Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards
Degree of protection		IP 66
Contact blocks type Z11, X11, Y11, W02 and Z02		
Rated insulation voltage U_i		500 V (degree of pollution 3)
Rated impulse withstand voltage U_{imp}		6 kV
Conventional free air thermal current I_{th}		10 A
Short-circuit protection - gG (gl) type fuses		10 A
Rated operational current		
I_e / AC-15	24 V - 50/60 Hz	10 A
	400 V - 50/60 Hz	1.8 A
I_e / DC-13	24 V - d.c.	2.8 A
	125 V - d.c.	0.55 A
	250 V - d.c.	0.27 A

Technical data approved by UL

Standards	Devices conform with UL 508
Contact blocks type Z11, X11, Y11, W02 and Z02	
Utilization categories	A600, Q600 (A300, Q300 when installed in SM/SDM series)
Contact blocks type X12P, X21P and W03P	
Utilization categories	A300, Q300

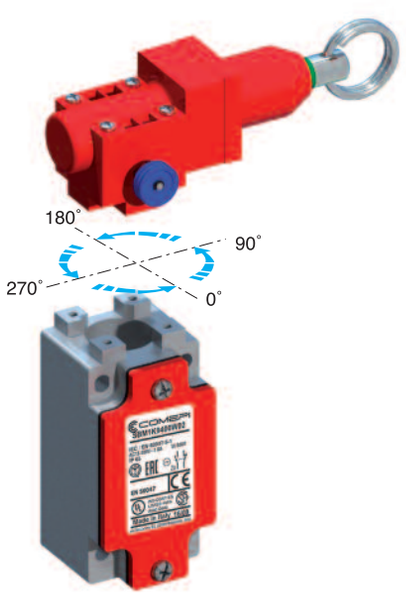
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.

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

Implementation

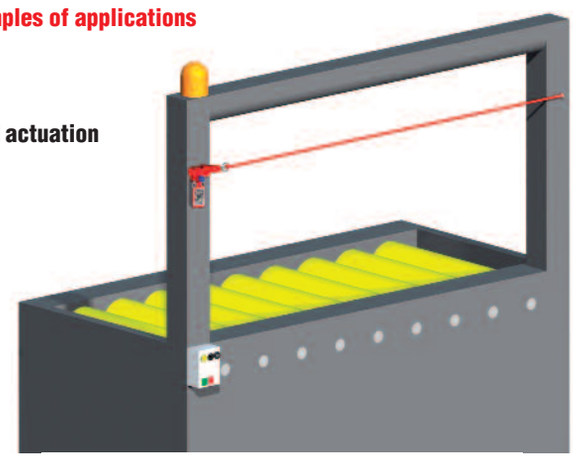
Operating head orientation

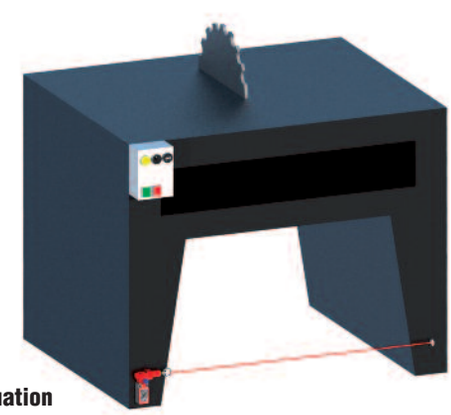
The head can be rotated each 90°.
Recommended tightening torque 0,5 Nm (max 0,8 Nm).



Examples of applications

Hand actuation





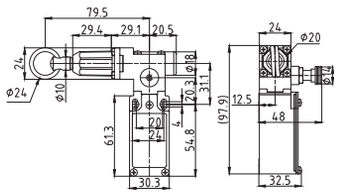
Foot actuation

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
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

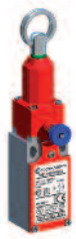
Contact Blocks

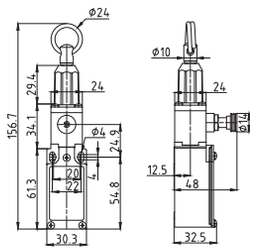
K9300 Pull wire with reset for emergency stop



Min. forces	**Initial 65N, Final 85N (95N ⊖)**
Weight	**275 g**
Operating diagram	**Page 54**

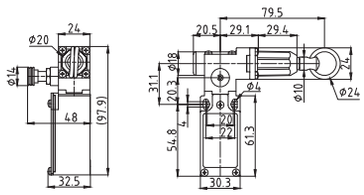
K9800 Pull wire with reset for emergency stop





Min. forces	**Initial 60N, Final 80N (90N ⊖)**
Weight	**230 g**
Operating diagram	**Page 54**

K9200 Pull wire with reset for emergency stop

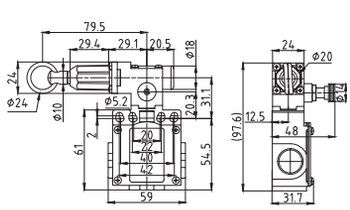


Min. forces	**Initial 65N, Final 85N (95N ⊖)**
Weight	**275 g**
Operating diagram	**Page 54**

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

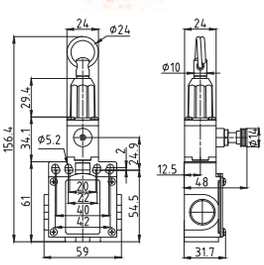
Contact Blocks

K9300 Pull wire with reset for emergency stop



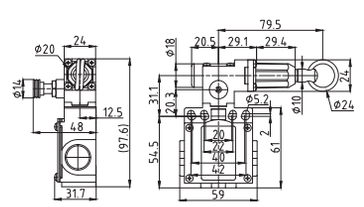
Min. forces	**Initial 65N, Final 85N (95N ⊖)**
Weight	**365 g**
Operating diagram	**Page 54**

K9800 Pull wire with reset for emergency stop



Min. forces	**Initial 60N, Final 80N (90N ⊖)**
Weight	**320 g**
Operating diagram	**Page 54**

K9200 Pull wire with reset for emergency stop



Min. forces	**Initial 65N, Final 85N (95N ⊖)**
Weight	**365 g**
Operating diagram	**Page 54**

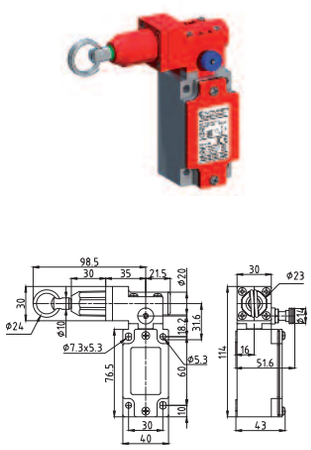
X11 (1NO+1NC)	SDM•K9300X11	SDM•K9800X11	SDM•K9200X11
W02 (2NC)	SDM•K9300W02	SDM•K9800W02	SDM•K9200W02
X12P (1NO+2NC)	SDM•K9300X12P	SDM•K9800X12P	SDM•K9200X12P
X21P (2NO+1NC)	SDM•K9300X21P	SDM•K9800X21P	SDM•K9200X21P
W03P (3NC)	SDM•K9300W03P	SDM•K9800W03P	SDM•K9200W03P

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

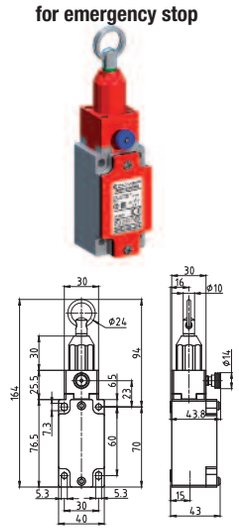
Contact Blocks

K9500 Pull wire with reset for emergency stop



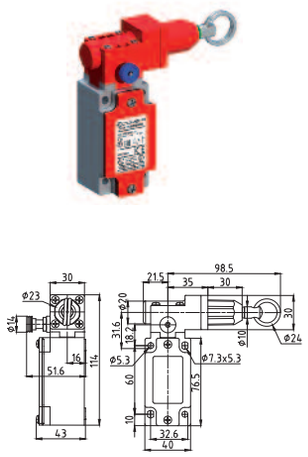
Min. forces	Initial 150N, Final 215N (230N ⊖)
Weight	320 g
Operating diagram	Page 54

K9900 Pull wire with reset for emergency stop



Min. forces	Initial 120N, Final 160N (170N ⊖)
Weight	250 g
Operating diagram	Page 54

K9400 Pull wire with reset for emergency stop

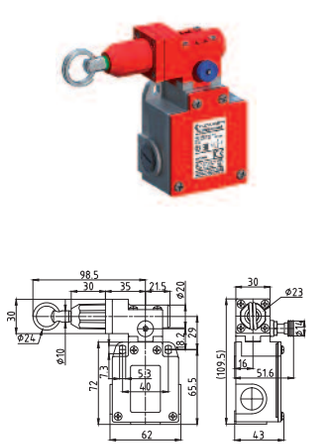


Min. forces	Initial 150N, Final 215N (230N ⊖)
Weight	320 g
Operating diagram	Page 54

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

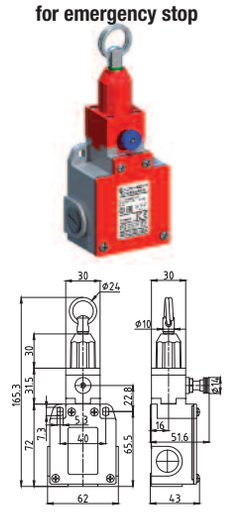
Contact Blocks

K9500 Pull wire with reset for emergency stop



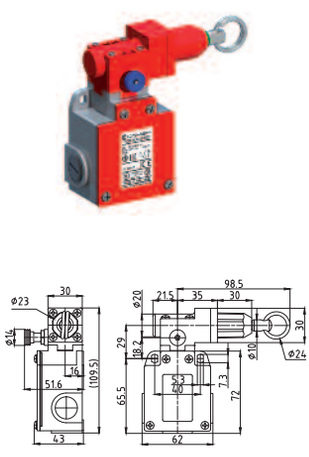
Min. forces	Initial 150N, Final 215N (230N ⊖)
Weight	345 g
Operating diagram	Page 54

K9900 Pull wire with reset for emergency stop



Min. forces	Initial 120N, Final 160N (170N ⊖)
Weight	275 g
Operating diagram	Page 54

K9400 Pull wire with reset for emergency stop



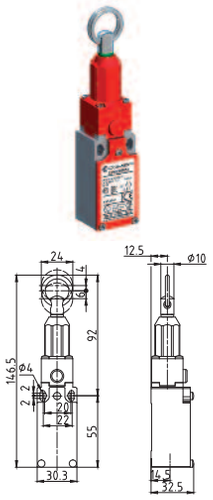
Min. forces	Initial 150N, Final 215N (230N ⊖)
Weight	345 g
Operating diagram	Page 54

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

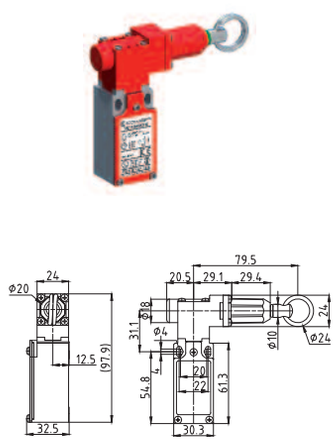
Electrical connection:
Replace the symbol "•" with the number of the thread desired
1: Cable gland PG 13.5
2: Cable gland 1/2" NPT
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

K96 Pull wire without reset for simple stop



Min. forces	**Initial 60N, Final 80N (90N ⊖)**
Weight	**220 g**
Operating diagram	**Page 54**

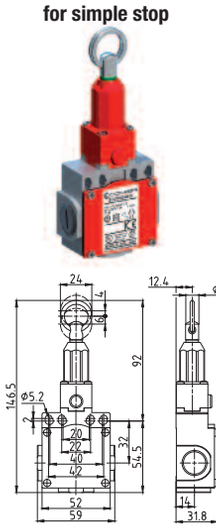
K9000 Pull wire without reset for simple stop



Min. forces	**Initial 65N, Final 85N (95N ⊖)**
Weight	**265 g**
Operating diagram	**Page 54**

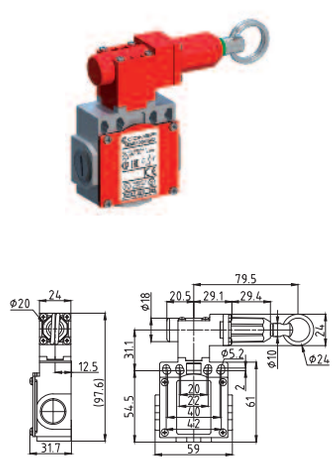
Contact Blocks		
X11 (1NO+1NC)	SM•K96X11	SM•K9000X11
W02 (2NC)	SM•K96W02	SM•K9000W02
X12P (1NO+2NC)	SM•K96X12P	SM•K9000X12P
X21P (2NO+1NC)	SM•K96X21P	SM•K9000X21P
W03P (3NC)	SM•K96W03P	SM•K9000W03P

K96 Pull wire without reset for simple stop



Min. forces	**Initial 60N, Final 80N (90N ⊖)**
Weight	**310 g**
Operating diagram	**Page 54**

K9000 Pull wire without reset for simple stop



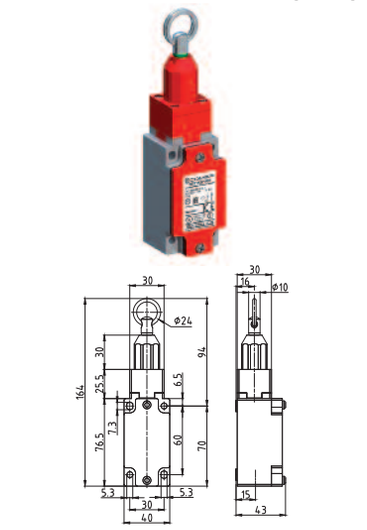
Min. forces	**Initial 65N, Final 85N (95N ⊖)**
Weight	**355 g**
Operating diagram	**Page 54**

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

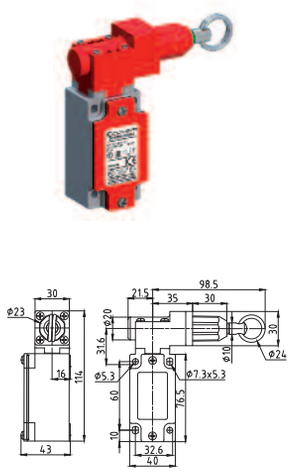
Electrical connection:
Replace the symbol "•" with the number of the thread desired
1: Cable gland PG 13.5
2: Cable gland 1/2" NPT
5: Cable gland M20 x 1,5

K97 Pull wire without reset for simple stop



Min. forces	**Initial 120N, Final 160N (170N ⊖)**
Weight	**240 g**
Operating diagram	**Page 54**

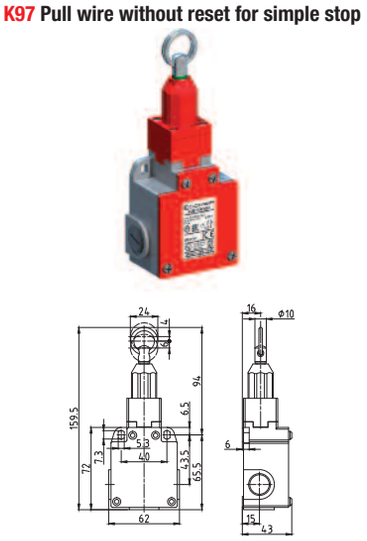
K9100 Pull wire without reset for simple stop



Min. forces	**Initial 150N, Final 215N (230N ⊖)**
Weight	**310 g**
Operating diagram	**Page 54**

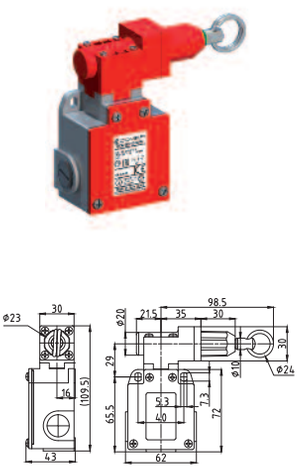
Contact Blocks			
X11	(1NO+1NC)	SBM•K97X11	SBM•K9100X11
W02	(2NC)	SBM•K97W02	SBM•K9100W02
X12	(1NO+2NC)	SBM•K97X12	SBM•K9100X12
X21	(2NO+1NC)	SBM•K97X21	SBM•K9100X21
W03	(3NC)	SBM•K97W03	SBM•K9100W03

K97 Pull wire without reset for simple stop



Min. forces	**Initial 120N, Final 160N (170N ⊖)**
Weight	**265 g**
Operating diagram	**Page 54**

K9100 Pull wire without reset for simple stop

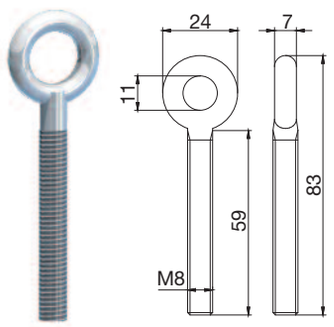


Min. forces	**Initial 150N, Final 215N (230N ⊖)**
Weight	**335 g**
Operating diagram	**Page 54**

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

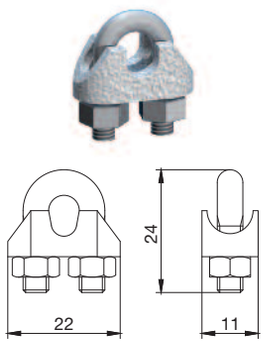
Safety Limit Switches with rope - Accessories

Stay Bolt



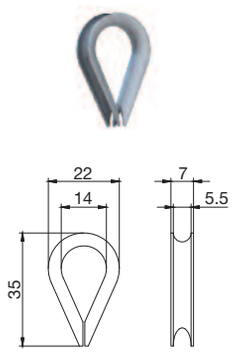
Code
OCC 08

Rope Clamp



Code
MOR 05

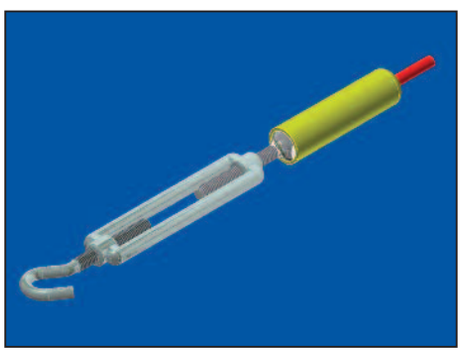
Rope eye

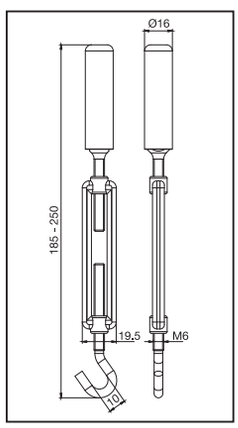


Code
RED 05

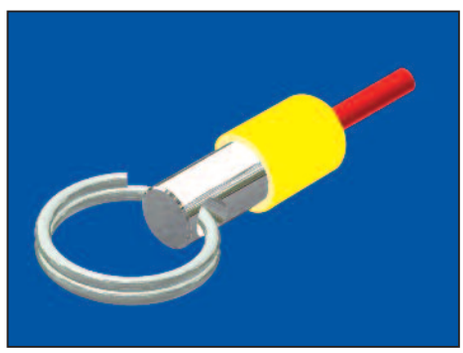
Rope ø 5mm

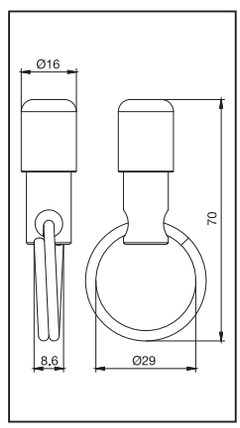
Code	Length
FUN05M010	10m
FUN05M015	15m
FUN05M020	20m
FUN05M025	25m
FUN05M102	102m



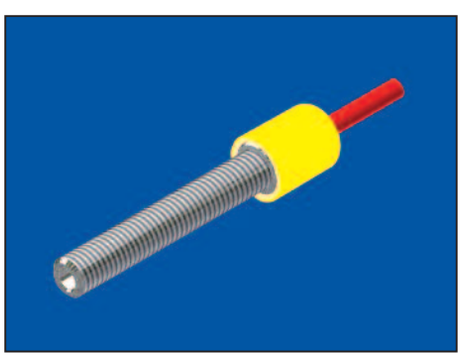


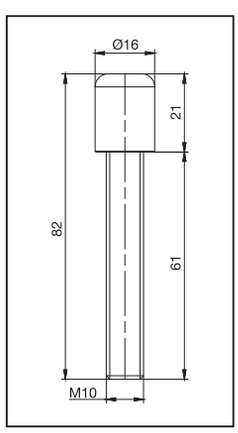
Code	Description
SLS-FX1	Hook stay bolt



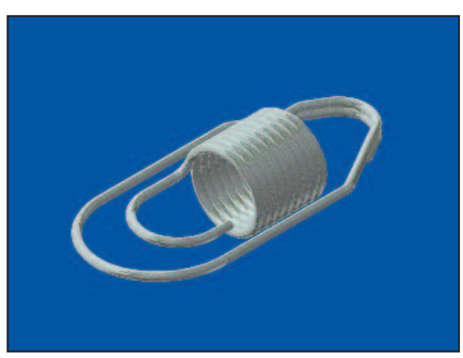


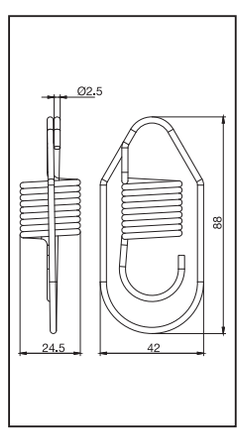
Code	Description
SLS-FX2	Fixing clamp



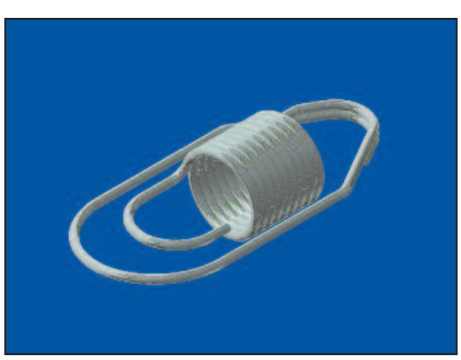


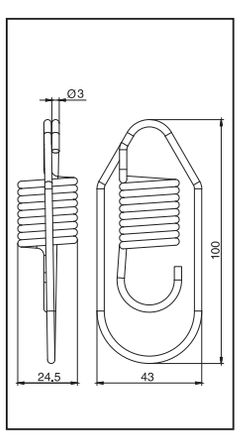
Code	Description
SLS-FX3	Stay bolt





Code	Description
SLS-M1	Spring for SM, SDM series



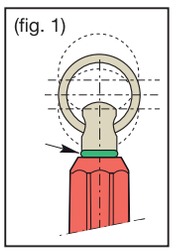


Code	Description
SLS-M2	Spring for SBM, SCM series

Safety Limit Switches with rope

Installation instructions

(fig. 1)



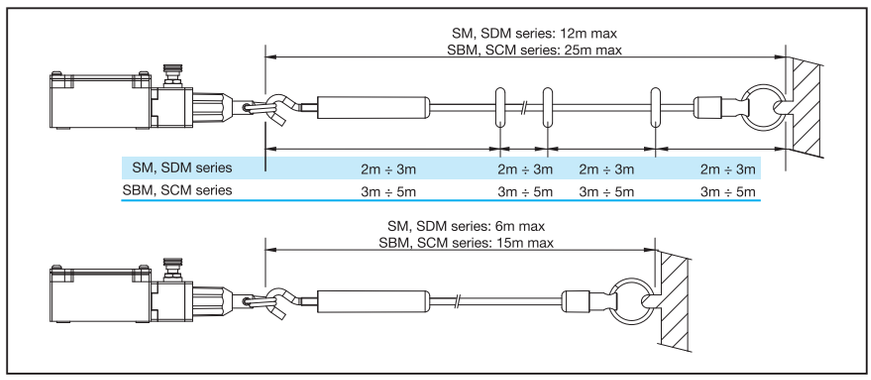
In order to obtain the correct operation of the device, please follow the following instructions.

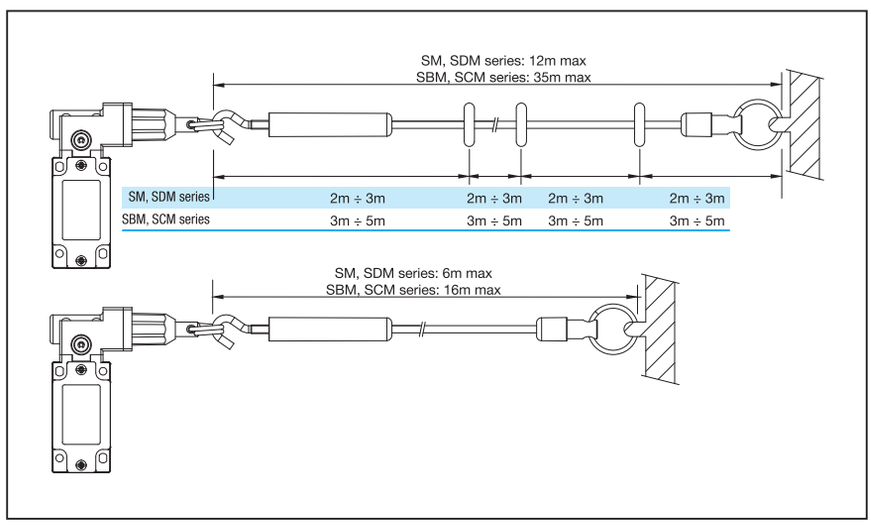
1. Install the switch and secure the fixed end of the rope. Apply tension to the extent the green O-ring is visible and the bottom is flush with the end of the red housing. (Fig. 1).
2. Pull the reset pommel in order to close the safety contacts of the limit switch.
3. The contacts inside the limit switch 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

R11
Steel plunger with reset

R13
Steel plunger with nylon roller with reset

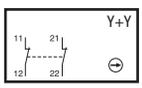
R31
Steel plunger with nylon roller with reset

R32
Steel plunger with nylon roller with reset

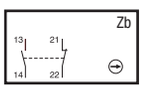
R38
Steel plunger with nylon roller with reset

R41
Lever with nylon roller with reset

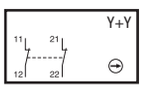
Z02: Snap action 2NC



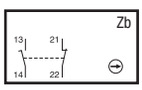
Z11: Snap action 1NO+1NC



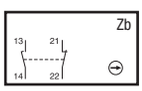
W02: Simultaneous slow action 2NC



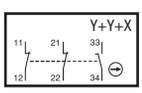
X11: Slow action break before make 1NO+1NC



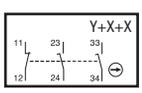
Y11: Slow action make before break 1NO+1NC



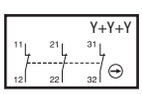
X12P: Slow action break before make 1NO+2NC



X21P: Slow action break before make 2NO+1NC



W03P: Simultaneous slow action 3NC



AP_R series (Plastic)

DP_R series (Plastic)

AM_R series (Metal)

DM_R series (Metal)

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 ⧈ 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				

Casing width:
A = 30 mm width + 1 cable inlet
D = 50 mm width + 2 cable inlets (DP series)
or 3 cable inlets (DM 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

Manual reset version

Operating heads: codes 11-13-31-32-38-41
- Other levers available upon request

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

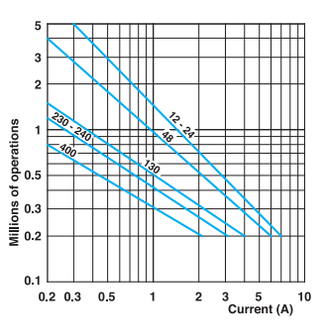
Technical Data

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

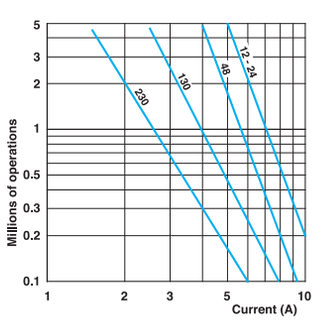
Electrical Data

Rated insulation voltage U_i - 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 X12P, X21P, W03P) A 600, Q 600 (A 300, Q 300 for AM/DM series and contacts type X12P, X21P, W03P)
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)		kV	6 (4 kV for contacts type X12P, X21P, W03P)
Conventional free air thermal current I_{th} (according to IEC 60947-5-1) $\theta < 40$ °C		A	10
Short-circuit protection $U_e < 500$ V a.c. - gG (gl) type fuses		A	10
Rated operational current			
I_e / AC-15 (according to IEC 60947-5-1)	24 V - 50/60 Hz	A	10
	120 V - 50/60 Hz	A	6
	400 V - 50/60 Hz	A	4
I_e / DC-13 (according to IEC 60947-5-1)	24 V - d.c.	A	2.8
	125 V - d.c.	A	0.55
	250 V - d.c.	A	0.27
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mΩ	25
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp (M3 for 3 poles contacts type)
Terminal for protective conductor			– / M3.5 (+, –) pozidriv 2 screw with cable clamp
Connecting capacity		1 or 2 x mm²	0.75 ... 2.5 (0.34... 1.5 for 3 poles contacts type)
Terminal marking			According to IEC 60947-5-1
Mechanical durability			1 million of operations
Electrical durability (according to IEC 60947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)
B10d = 2.000.000 cycles			

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

• **Ordering details** ..... page 32 - 35
• **Additional Technical Data** ..... page 52

Technical Data

Technical data approved by IMQ

Standards		Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards
Degree of protection		IP 65 (AP/DP series) , IP 66 (AM/DM series)

Contact blocks type Z11, X11, Y11, W02 and Z02

Rated insulation voltage U_i		500 V (degree of pollution 3)
Rated impulse withstand voltage U_{imp}		6 kV
Conventional free air thermal current I_{th}		10 A
Short-circuit protection - gG (gl) type fuses		10 A
Rated operational current		
I_e / AC-15	24 V - 50/60 Hz	10 A
	400 V - 50/60 Hz	1.8 A
I_e / DC-13	24 V - d.c.	2.8 A
	125 V - d.c.	0.55 A
	250 V - d.c.	0.27 A

Technical data approved by UL

Standards	Devices conform with UL 508

Contact blocks type Z11, X11, Y11, W02 and Z02

Utilization categories	A600, Q600
	(A300, Q300 when installed in AM/DM series)

Contact blocks type X12P, X21P and W03P

Utilization categories	A300, Q300

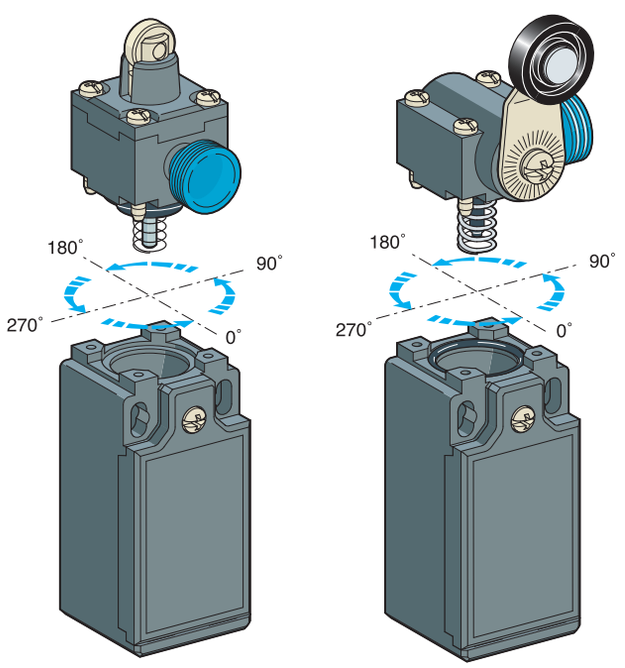
Use 60/75°C copper (Cu) conductor only. Wire rages 14-18 AWG stranded or solid. The terminal tightening torque of 7 lbs-in / 0.78 Nm. Suitable for conduit connection only with use of adapter sleeve optionally provided or recommended by the manufacturer.

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

Implementation

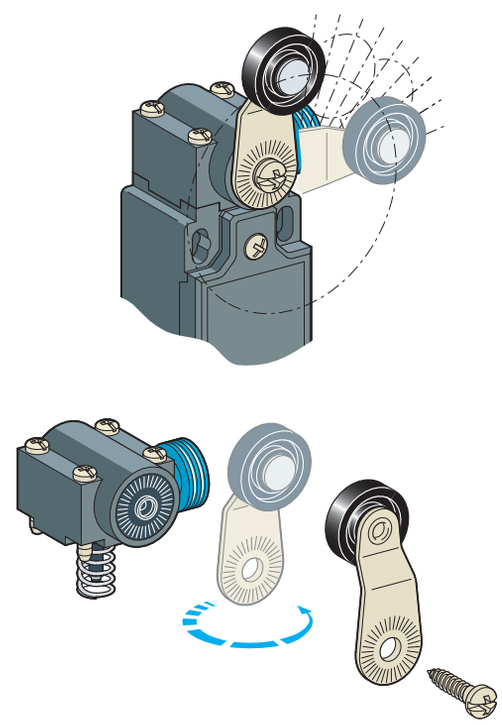
Operating head orientation

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



Lever adjustment

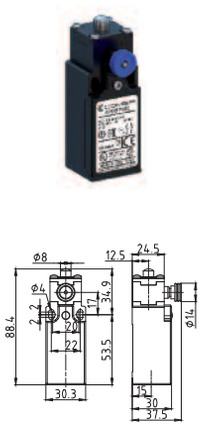
The lever of the head model R41 can ber adjusted every 10° and round turned in order to, obtain the maximum flexibility on the working plan
Recommended tightening torque 0,5 Nm (max 0,8 Nm).



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

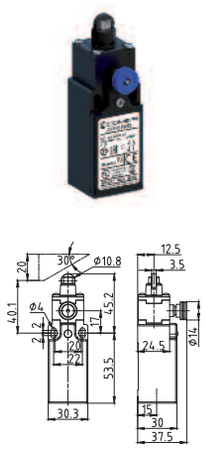
Electrical connection:
Replace the symbol "•" with the number of the thread desired
1: Cable gland PG 13.5
2: Cable gland 1/2" NPT (with adapter)
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

R11 Steel plunger with reset



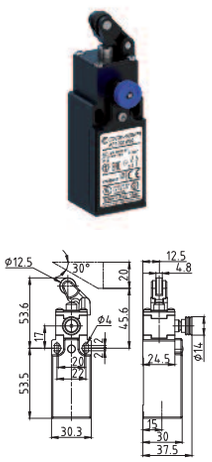
Min. actuating force	15 N (30N ⊖)
Weight	90 g
Operating diagram	Page 52

R13 Steel plunger with nylon roller with reset



Min. actuating force	12 N (30N ⊖)
Weight	90 g
Operating diagram	Page 52

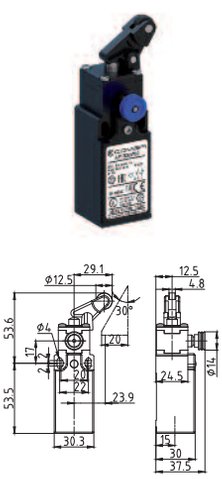
R31 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	95 g
Operating diagram	Page 52

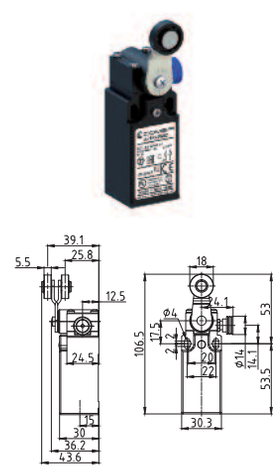
Contact Blocks				
Z11	(1NO+1NC)	AP•R11Z11	AP•R13Z11	AP•R31Z11
X11	(1NO+1NC)	AP•R11X11	AP•R13X11	AP•R31X11
Y11	(1NO+1NC)	AP•R11Y11	AP•R13Y11	AP•R31Y11
W02	(2NC)	AP•R11W02	AP•R13W02	AP•R31W02
Z02	(2NC)	AP•R11Z02	AP•R13Z02	AP•R31Z02
X12P	(1NO+2NC)	AP•R11X12P	AP•R13X12P	AP•R31X12P
X21P	(2NO+1NC)	AP•R11X21P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

R32 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	95 g
Operating diagram	Page 52

R41 Lever with nylon roller with reset



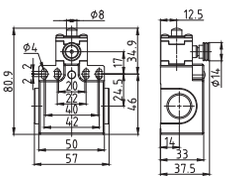
Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	95 g
Operating diagram	Page 52

Contact Blocks			
Z11	(1NO+1NC)	AP•R32Z11	AP•R41Z11
X11	(1NO+1NC)	AP•R32X11	AP•R41X11
Y11	(1NO+1NC)	AP•R32Y11	AP•R41Y11
W02	(2NC)	AP•R32W02	AP•R41W02
Z02	(2NC)	AP•R32Z02	AP•R41Z02
X12P	(1NO+2NC)	AP•R32X12P	AP•R41X12P
X21P	(2NO+1NC)	AP•R32X21P	AP•R41X21P
W03P	(3NC)	AP•R32W03P	AP•R41W03P

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

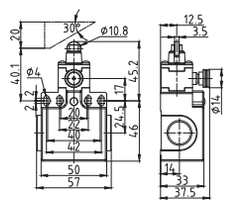
Electrical connection:
Replace the symbol "•" with the number of the thread desired
1: Cable gland PG 13.5
2: Cable gland 1/2" NPT (with adapter)
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

R11 Steel plunger with reset



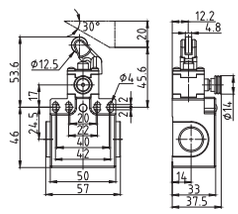
Min. actuating force	15 N (30N ⊖)
Weight	120 g
Operating diagram	Page 52

R13 Steel plunger with nylon roller with reset



Min. actuating force	12 N (30N ⊖)
Weight	120 g
Operating diagram	Page 52

R31 Steel plunger with nylon roller with reset

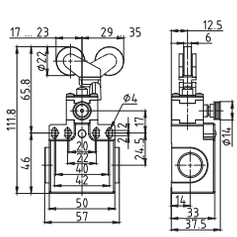


Min. actuating force	7 N (24N ⊖)
Weight	125 g
Operating diagram	Page 52

Contact Blocks

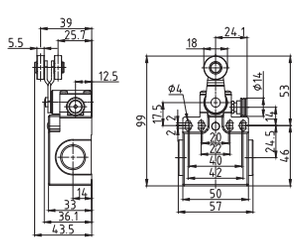
Z11	(1NO+1NC)	DP•R11Z11	DP•R13Z11	DP•R31Z11
X11	(1NO+1NC)	DP•R11X11	DP•R13X11	DP•R31X11
Y11	(1NO+1NC)	DP•R11Y11	DP•R13Y11	DP•R31Y11
W02	(2NC)	DP•R11W02	DP•R13W02	DP•R31W02
Z02	(2NC)	DP•R11Z02	DP•R13Z02	DP•R31Z02
X12P	(1NO+2NC)	DP•R11X12P	DP•R13X12P	DP•R31X12P
X21P	(2NO+1NC)	DP•R11X21P	DP•R13X21P	DP•R31X21P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

R38 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	125 g
Operating diagram	Page 52

R41 Lever with nylon roller with reset



Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	125 g
Operating diagram	Page 52

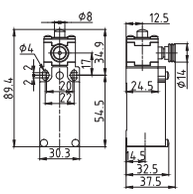
Contact Blocks

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

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

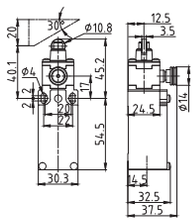
Electrical connection:
Replace the symbol "•" with the number of the thread desired
1: Cable gland PG 13.5
2: Cable gland 1/2" NPT
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

R11 Steel plunger with reset



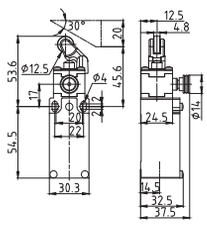
Min. actuating force	15 N (30N ⊖)
Weight	185 g
Operating diagram	Page 52

R13 Steel plunger with nylon roller with reset



Min. actuating force	12 N (30N ⊖)
Weight	185 g
Operating diagram	Page 52

R31 Steel plunger with nylon roller with reset

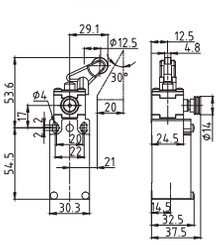


Min. actuating force	7 N (24N ⊖)
Weight	190 g
Operating diagram	Page 52

Contact Blocks

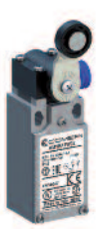
Z11	(1NO+1NC)	AM•R11Z11	AM•R13Z11	AM•R31Z11
X11	(1NO+1NC)	AM•R11X11	AM•R13X11	AM•R31X11
Y11	(1NO+1NC)	AM•R11Y11	AM•R13Y11	AM•R31Y11
W02	(2NC)	AM•R11W02	AM•R13W02	AM•R31W02
Z02	(2NC)	AM•R11Z02	AM•R13Z02	AM•R31Z02
X12P	(1NO+2NC)	AM•R11X12P	AM•R13X12P	AM•R31X12P
X21P	(2NO+1NC)	AM•R11X21P	AM•R13X21P	AM•R31X21P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

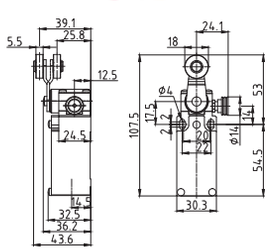
R32 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	190 g
Operating diagram	Page 52

R41 Lever with nylon roller with reset





Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	190 g
Operating diagram	Page 52

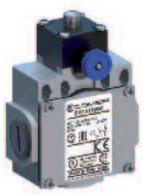
Contact Blocks

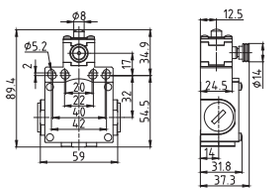
Z11	(1NO+1NC)	AM•R32Z11	AM•R41Z11
X11	(1NO+1NC)	AM•R32X11	AM•R41X11
Y11	(1NO+1NC)	AM•R32Y11	AM•R41Y11
W02	(2NC)	AM•R32W02	AM•R41W02
Z02	(2NC)	AM•R32Z02	AM•R41Z02
X12P	(1NO+2NC)	AM•R32X12P	AM•R41X12P
X21P	(2NO+1NC)	AM•R32X21P	AM•R41X21P
W03P	(3NC)	AM•R32W03P	AM•R41W03P

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
3: Cable gland PG 11
4: Cable gland M16 x 1,5
5: Cable gland M20 x 1,5

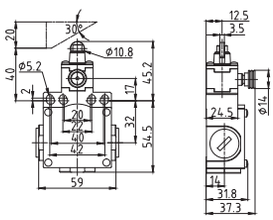
R11 Steel plunger with reset





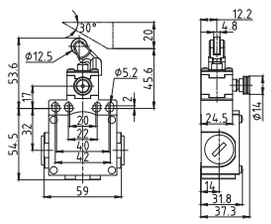
Min. actuating force	15 N (30N ⊖)
Weight	245 g
Operating diagram	Page 52

R13 Steel plunger with nylon roller with reset



Min. actuating force	12 N (30N ⊖)
Weight	245 g
Operating diagram	Page 52

R31 Steel plunger with nylon roller with reset

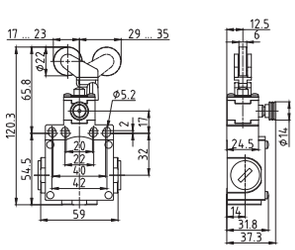


Min. actuating force	7 N (24N ⊖)
Weight	250 g
Operating diagram	Page 52

Contact Blocks

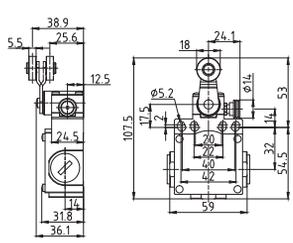
Z11	(1NO+1NC)	DM•R11Z11	DM•R13Z11	DM•R31Z11
X11	(1NO+1NC)	DM•R11X11	DM•R13X11	DM•R31X11
Y11	(1NO+1NC)	DM•R11Y11	DM•R13Y11	DM•R31Y11
W02	(2NC)	DM•R11W02	DM•R13W02	DM•R31W02
Z02	(2NC)	DM•R11Z02	DM•R13Z02	DM•R31Z02
X12P	(1NO+2NC)	DM•R11X12P	DM•R13X12P	DM•R31X12P
X21P	(2NO+1NC)	DM•R11X21P	DM•R13X21P	DM•R31X21P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

R38 Steel plunger with nylon roller with reset



Min. actuating force	7 N (24N ⊖)
Weight	250 g
Operating diagram	Page 52

R41 Lever with nylon roller with reset

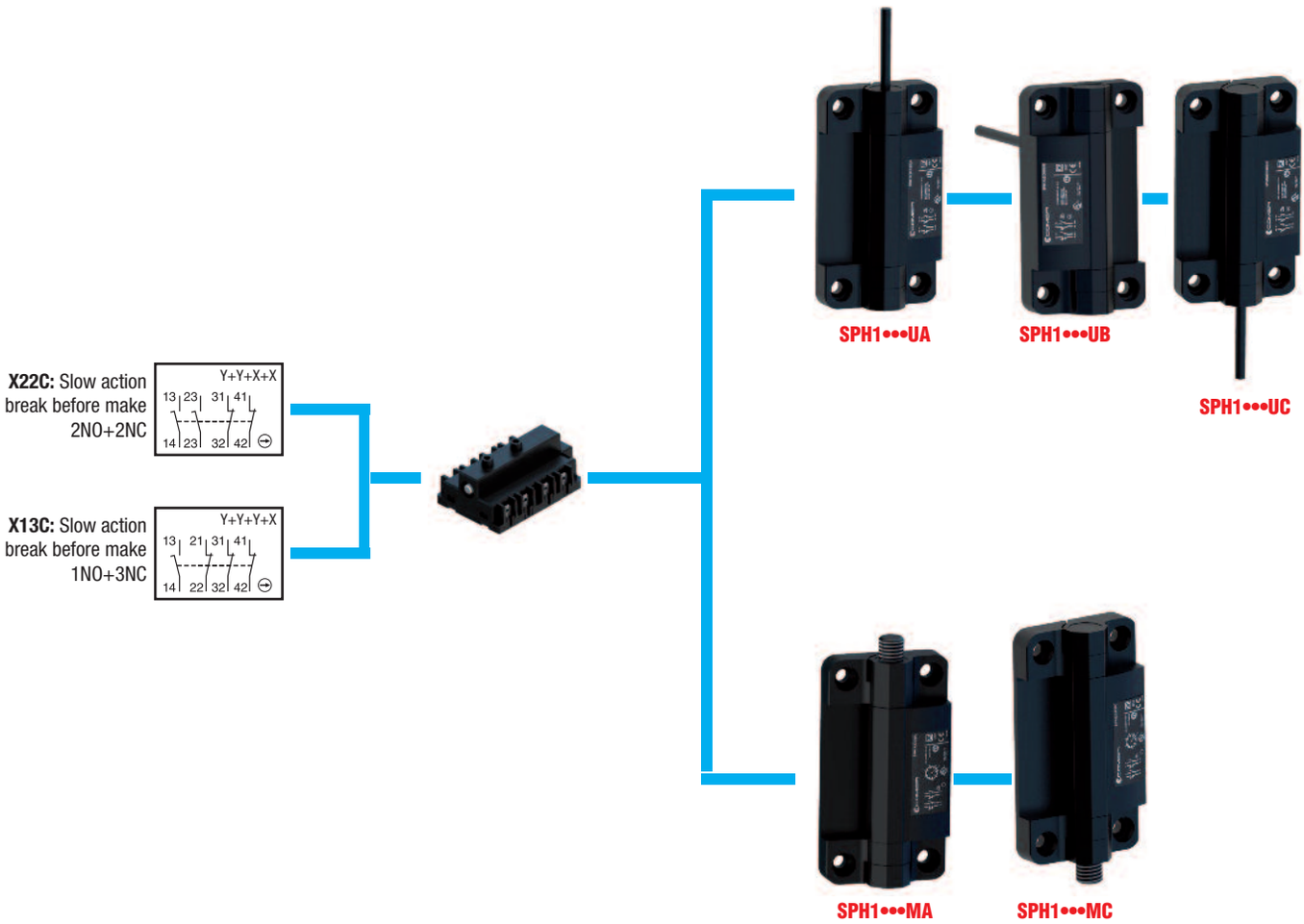


Min. actuating torque	0,10 Nm (0,32 Nm ⊖)
Weight	250 g
Operating diagram	Page 52

Contact Blocks

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

Safety Hinges



Complementary Mechanical hinges

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 mm² PVC cable standard lenghts: 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 mm² 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

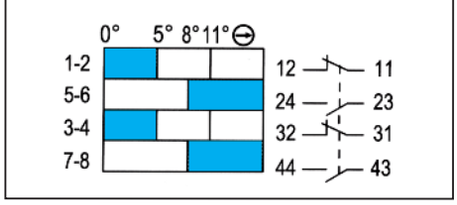
			SPH Series
Standards			IEC 60947-5-1, EN 60947-5-1 UNI EN ISO 14119
Certifications - Approvals			UL - IMQ - EAC
Air temperature near the device			
– during operation		°C	– 20 ... + 80
– for storage		°C	– 20 ... + 80
Mounting positions			All positions are authorised
Protection against electrical shocks (acc. to IEC 536)			Class II
Degree of protection (according to IEC 529 and EN 60 529)			IP 67

Electrical Data

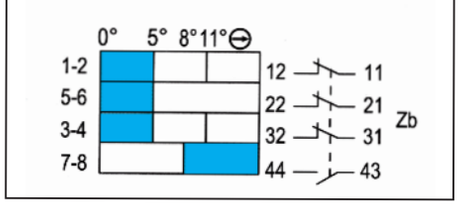
Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14			400 V (degree of pollution 3) (24 V for M12 connector) C 300, Q 300 (class II for M12 connector)
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	4 (2,5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

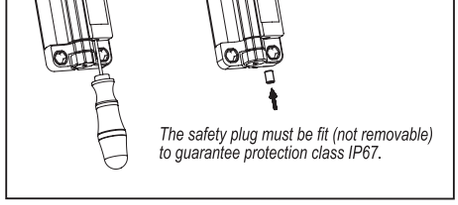
Operating diagrams

X22C



X13C





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 ovelapping contacts.

Safety hinges - Technical Data

Technical data approved by IMQ

Standards		Devices conform with international IEC 60947-5-1 and European EN 60947-5-1 standards
Degree of protection		IP 67
Rated insulation voltage U_i		400 V (degree of pollution 3)
Rated impulse withstand voltage U_{imp}		4 kV (2,5 kV for M12 connector)
Conventional free air thermal current I_{th}		4 A (2,5 A for M12 connector)
Short-circuit protection - gG type fuses		4 A
Rated operational current		
I_e / AC-15	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
I_e / DC-13	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

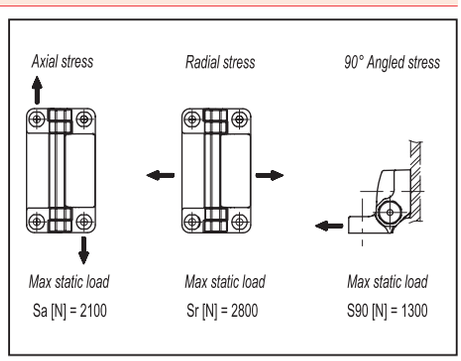
Standards	Devices conform with UL 508
Utilization categories	
Cable “U-Type”	C300, Q300
Connector / Cable+Connector “M-Type”	24 V / 2 A Class II

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

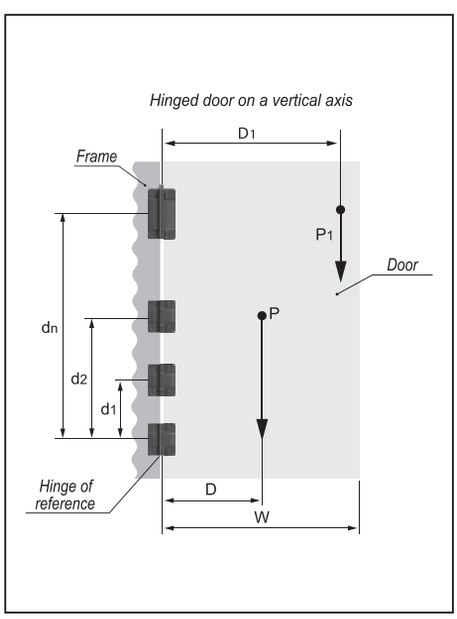
Implementation

Determination of maximum applicable load

For SPH1 hinges with built-in safety multiple switch, the reference value supplied is the max limit static load (Sa, Sr, S90), 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 + ... + 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

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

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

$$\frac{[(P \cdot D)+(P1 \cdot D1)]}{d_T} \cdot k < S90$$

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

P = 294 N (30 Kg) D = 0,4 m N = 3
d_T = 1,5 m d_2 = 1 m d_1 = 0,5 m
P_1 = 196 N (20 Kg) D_1 = 1,2 m

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

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

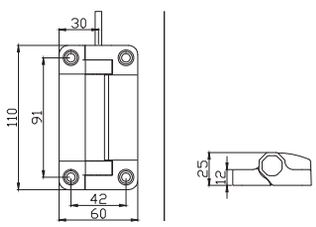
$$\frac{[(294 \cdot 0,4)+(196 \cdot 1,2)]}{1,5} = 235,2 \cdot k < 1300$$

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.

Polymeric casing. IP67

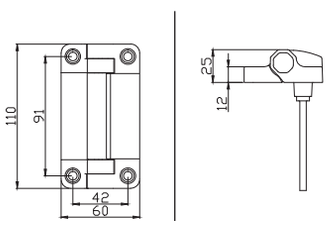
Electrical connection:
Replace the symbol "•••" with the lenght of the cable desired
020: Cable lenght 2m
050: Cable lenght 5m

Top axial exit with cable



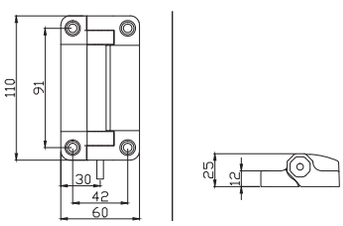
Min. actuating torque	0,5 Nm ⊖
Weight	280 g
Operating diagram	Page 38

Back exit with cable



Min. actuating torque	0,5 Nm ⊖
Weight	280 g
Operating diagram	Page 38

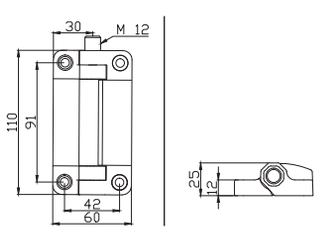
Bottom axial exit with cable



Min. actuating torque	0,5 Nm ⊖
Weight	280 g
Operating diagram	Page 38

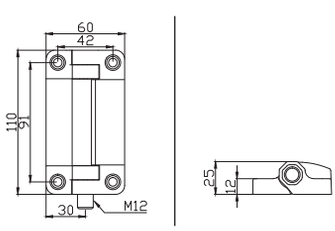
Contact Blocks			
X22C (2NO+2NC)	SPH1X22C•••UA	SPH1X22C•••UB	SPH1X22C•••UC
X13C (1NO+3NC)	SPH1X13C•••UA	SPH1X13C•••UB	SPH1X13C•••UC

Top axial exit with M12 connector



Min. actuating torque	0,5 Nm ⊖
Weight	140 g
Operating diagram	Page 38

Bottom axial exit with M12 connector



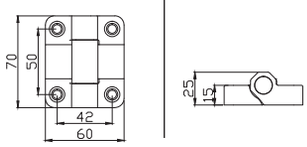
Min. actuating torque	0,5 Nm ⊖
Weight	140 g
Operating diagram	Page 38

Contact Blocks		
X22C (2NO+2NC)	SPH1X22CMA	SPH1X22CMC
X13C (1NO+3NC)	SPH1X13CMA	SPH1X13CMC

Safety hinges - Accessories

Complementary mechanical hinges
Glass-fibre reinforced technopolymer

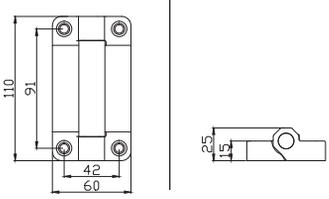
Complementary hinge 70 mm



Weight	85 g

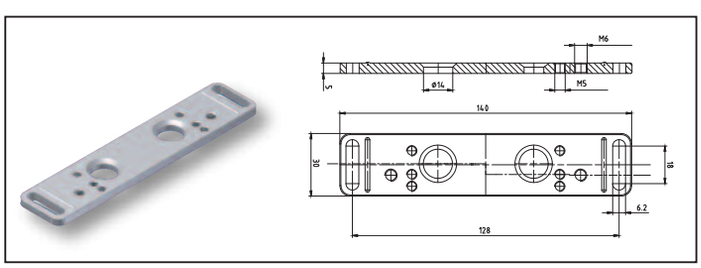
SPH1-COMP1

Complementary hinge 110 mm

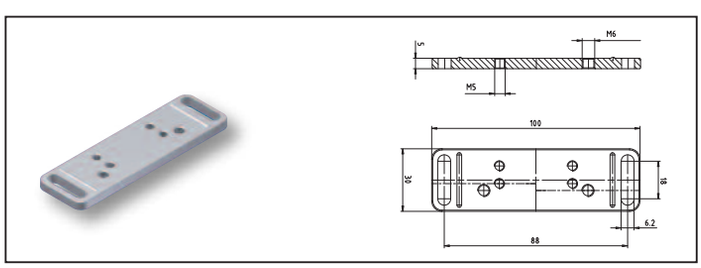


Weight	130 g

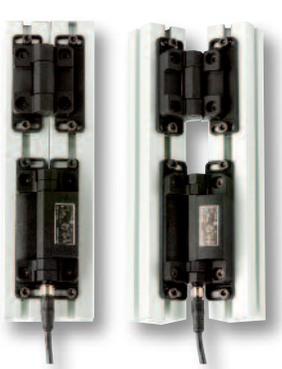
SPH1-COMP2



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).

7 mm Safety Magnetic Sensors

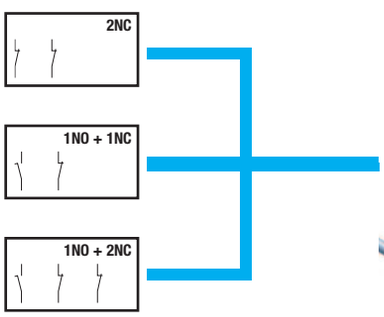
Safety Magnetic Target - SMP1 series

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

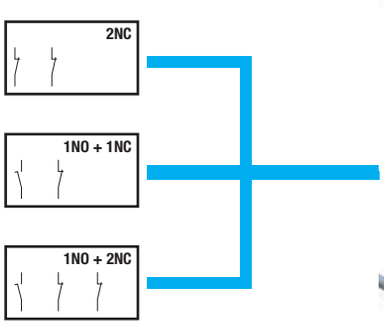
SMP2AMG

Actuation distance 8 mm

SMP2BMG

Safety Magnetic Sensors

Contacts



SMP2A•••

SMP2A•••K

SMP2A•••001M

SMP2A•••L

SMP2A•••KL

SMP2A•••001ML

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 Integraty 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.

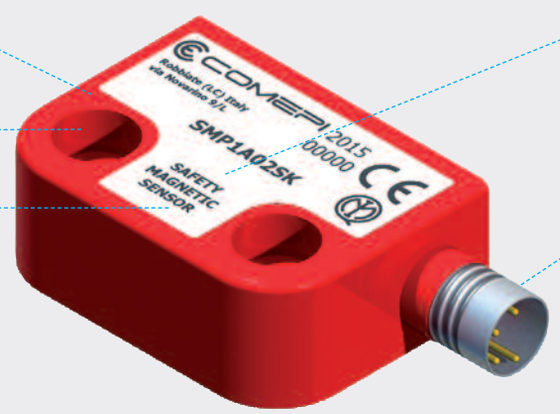
Description

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

Example:	SMP	1A	11	S	010		
Structure:	SMP						

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

Direction of the Output Connection
Null: Right
L: Left

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

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

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

Electrical Data

Rated insulation voltage U_i 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)
Rated impulse withstand voltage U_{imp}	kV	6 (1,5 for M8 or M12 connectors)
Conventional free air thermal current I_{th} (according to IEC 60947-5-1) $\theta < 40$ °C	A	0,25
Rated voltage / current		24 Vac / dc - 0,25 A (resistive load)
Max resistive load	W	6 (external fuse 0,25 A type F)
Electrical durability		1.000.000 operations

Approvals

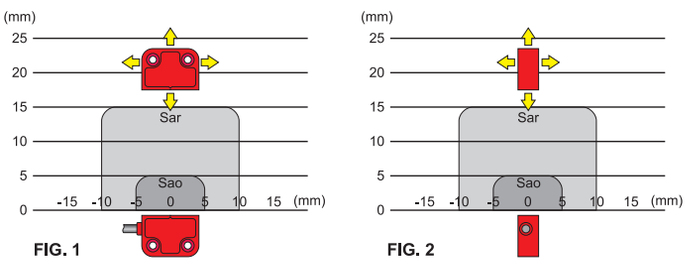
Standards	EN 60947-1, EN 60947-5-1, EN 60947-5-2, EN 60947-5-3 (*) , EN ISO 14119, EN ISO 12100-1, EN ISO 12100-2, EN ISO 13849-1, EN ISO 13849-2, EN 60204-1, EN 60529
Directives	2006/95/CE low voltage 2006/42/CE machinery 2004/108/CE electromagnetic
Certifications	CE - IMQ

Safety Magnetic Sensors - Technical Data

Implementation

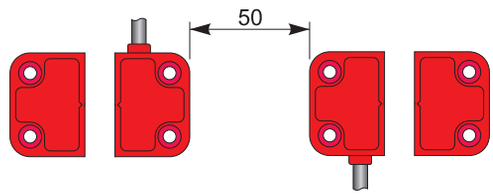
SMP1AMG

Switching distance



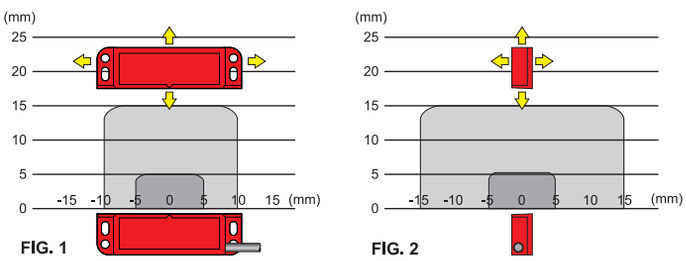
N.B.: Le aree di attivazione mostrate in fig. 1 e fig. 2 sono indicative.

Minimum distance between sensors



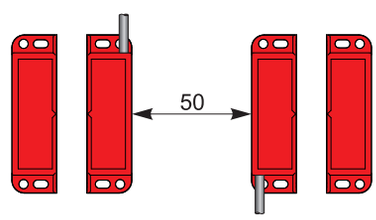
SMP2AMG

Switching distance



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

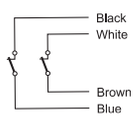
Minimum distance between sensors



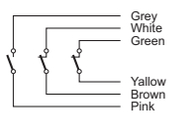
Electrical connections

Cable connections

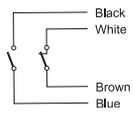
2NC



1NO+2NC

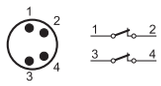


1NO+1NC

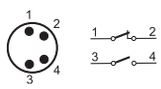


M8 connections

2NC

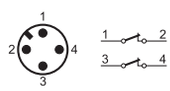


1NA+1NC

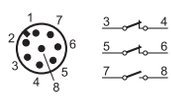


Cable + M12 connections

2NC

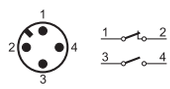


1NO+2NC

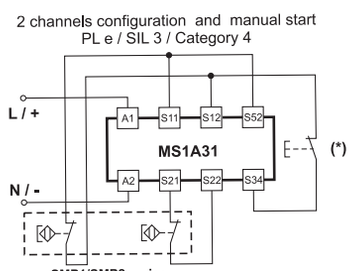


Pins 1 and 2 are disconnected

1NO+1NC



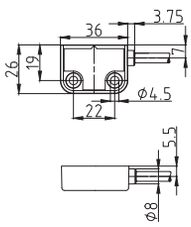
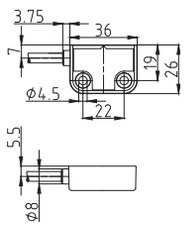
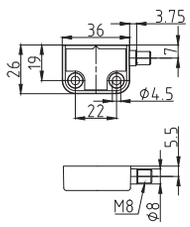
Example of connection with safety module



(*) If between S12 and S34 it is connected a jumper instead of the button you get the 2-channel configuration with automatic start.

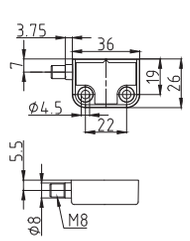
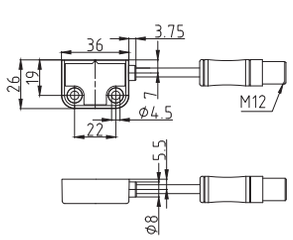
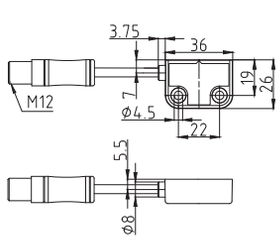
SMP1 - Polymeric housing - IP67

Safety Magnetic Target SMP1AMG
Actuation distance: 5 mm.

	Cable connection	Cable connection	M8 integrated connector
			
Weight	**75 g**	**75 g**	**35 g**
Operating diagram	**Page 45**	**Page 45**	**Page 45**
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 lenght of the cable desired
010: Cable lenght 1m
020: Cable lenght 2m

Safety Magnetic Target SMP1AMG
Actuation distance: 5 mm.

	M8 integrated connector	M12 connector	M12 connector
			
Weight	**35 g**	**50 g**	**50 g**
Operating diagram	**Page 45**	**Page 45**	**Page 45**
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

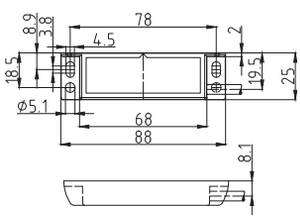
SMP2- Polymeric housing - IP67

Safety Magnetic Target SMP2AMG
Actuation distance: 5 mm.

Safety Magnetic Target SMP2BMG
Actuation distance: 8 mm.

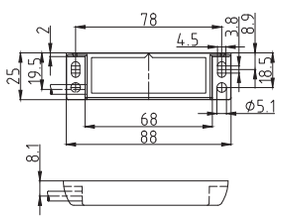
Contact Blocks

Cable connection



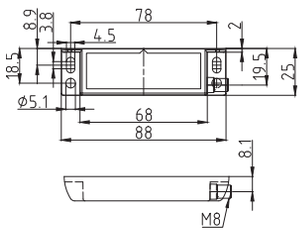
Weight	**90 g**
Operating diagram	**Page 45**

Cable connection



Weight	**90 g**
Operating diagram	**Page 45**

M8 integrated connector



Weight	**55 g**
Operating diagram	**Page 45**

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

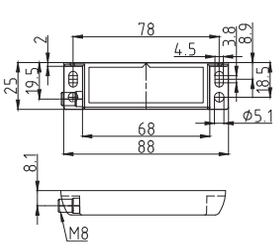
Electrical connection: Replace the symbol "•••" with the lenght of the cable desired
010: Cable lenght 1m
020: Cable lenght 2m

Safety Magnetic Target SMP2AMG
Actuation distance: 5 mm.

Safety Magnetic Target SMP2BMG
Actuation distance: 8 mm.

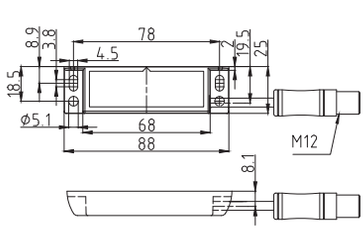
Contact Blocks

M8 integrated connector



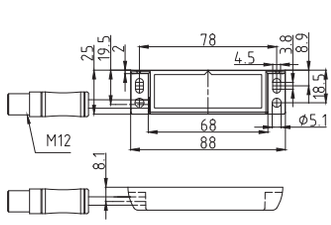
Weight	**55 g**
Operating diagram	**Page 45**

M12 connector



Weight	**70 g**
Operating diagram	**Page 45**

M12 connector



Weight	**70 g**
Operating diagram	**Page 45**

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

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
- 3NO safety contacts + 1NC contact for signalling
- Suitable for use with electromecanic 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 mm²

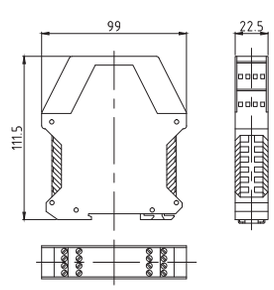
LED indicators for status, supply and diagnostic
- Power
- Channel 1
- Channel 2

Symbols

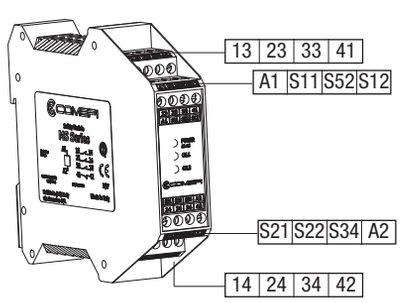
Example:	MS1A31	–	024
Structure:	MS1A31	–	

Tensione di alimentazione:
024: 24V AC/DC
120: 120V AC
230: 230V AC

Dimensions (mm)



Electrical connection



A1-A2: Supply voltage
S11: +24 V output
S12: Input Channel 1
S22: Input Channel 2 (connect to +24 V)
S52: Input Channel 2 (connect to GND)
S21: GND output
S34: Manual/automatic start input
13-14: Safety NO output contact
23-24: Safety NO output contact
33-34: Safety NO output contact
41-42: NC output contact for signalling

Cross section of the conductors: 0,2...2,5 mm² (24...12 AWG)
Torque: 0,5 Nm (0,6 Nm max)

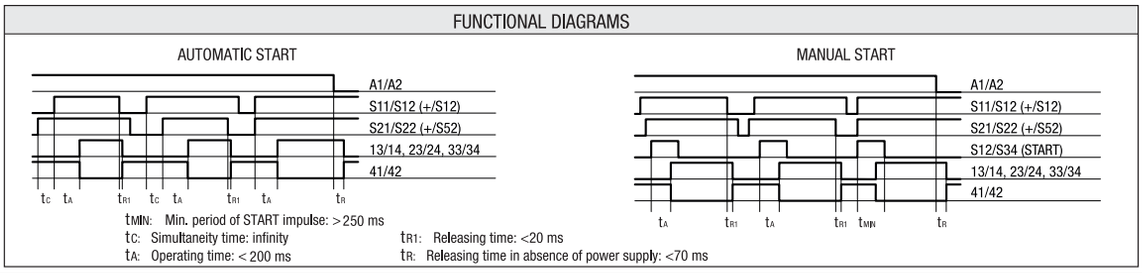
Safety modules - Technical Data

		MS Series
Standards		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
Directives		2006/95/CE low voltage 2006/42/CE machinery 2004/108/CE electromagnetic
Certifications - Approvals		CE - IMQ
Air temperature near the device		
– during operation	°C	– 25 ... + 55
– for storage	°C	– 25 ... + 55
Protection against electrical shocks (acc. to IEC 60536)		Class II
Degree of protection (according to IEC 60529 and EN 60529)		Casing IP40 - Terminal blocks IP20
Pollution degree		3 external, 2 internal
Safety integrity level (Sil CL) (according to EN IEC 62061)		Up to Sil 3
Performance level (PL) (according to EN ISO 13849-1)		Up to PLe
Safety category (according to EN ISO 13849-1)		Up to Cat 4
Mechanical durability		10 millions of operations
Electrical durability		100.000 operations
MTTFd		218 (for 24 Vac/dc) / 147 (for 120 Vac and 230 Vac)
Diagnostic coverage		H
PFHd		4,58 E^{-10} (for 24 Vac/dc) / 6,61 E^{-10} (for 120 Vac and 230 Vac)

Electrical Data

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

FUNCTIONAL DIAGRAMS

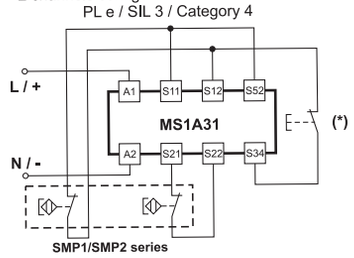


t_{MIN}: Min. period of START impulse: > 250 ms
t_C: Simultaneity time: infinity
t_A: Operating time: < 200 ms
t_{R1}: Releasing time: <20 ms
t_R: Releasing time in absence of power supply: <70 ms

Output circuit	
Utilization categories (according to EN 60947-1)	AC 15, Ue = 230 V, Ie = 3 A / DC 13, Ue = 24 V, Ie = 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^2)
Max contact resistance	100 mΩ

Example of connection with safety magnetic sensors

2 channels configuration and manual start
PL e / SIL 3 / Category 4



(*) If between S12 and S34 it is connected a jumper instead of the button you get the 2-channel configuration with automatic start.

General Technical Data, Specifications, Directives and Standards

The **Comepi** 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 contracditory 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 is 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.
- **Electromegnetic 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 Devices 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.

General Technical Data, Specifications, Directives and Standards

Double Insulation ⧈

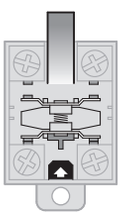
Class II materials, according to IEC 536, are designed with double insulation. This measure consists in doubling the functional insulation with an additional layer of insulation so as to eliminate the risk of electric shock and thus not having to protect elsewhere. No conductive part of "double insulated"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

Positive Opening Operation ⊖

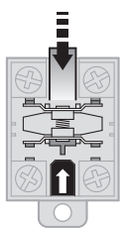
A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between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

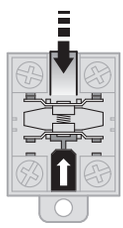
Snap action contacts are characterised by a release position that is distinct from the operating position (differential travel). Snap breaking of moving contacts is independent of the switch actuator's speed and contributes to regular electric performance even for slow switch actuator speeds.



State of rest



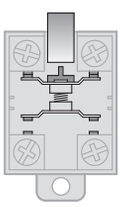
Contact change



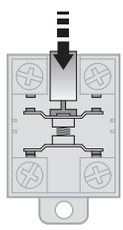
Positive opening

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.



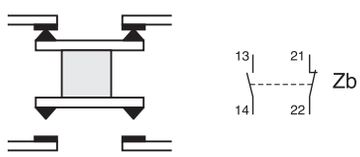
State of rest



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

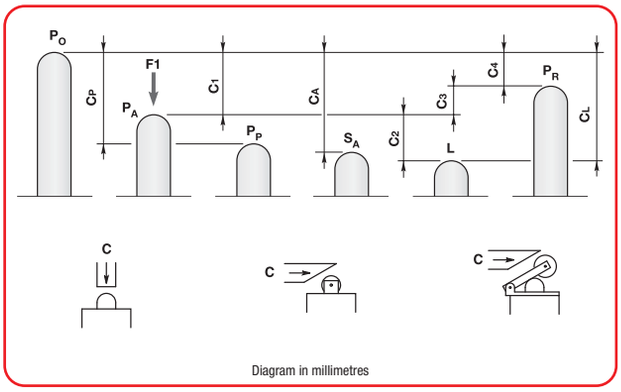


Diagram in millimetres

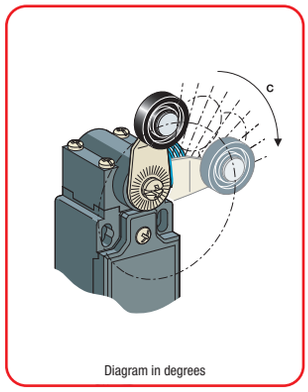


Diagram in degrees

Diagram for snap action contacts:

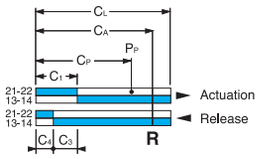
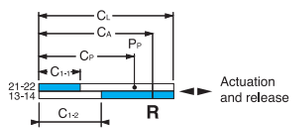


Diagram for non-overlapping slow action contacts:



P_0 Free position: position of the switch actuator when no external force is exerted on it.
P_A Operating position: position of the switch actuator, under the effect of force F1, when the contacts leave their initial free position.
P_P Positive opening position: position of the switch actuator from which positive opening is ensured.
S_A 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_R Release position: position of the switch actuator when the contacts return to their initial free position.
C_1 Pre-travel: distance between the free position P_0 and the operating position P_A.

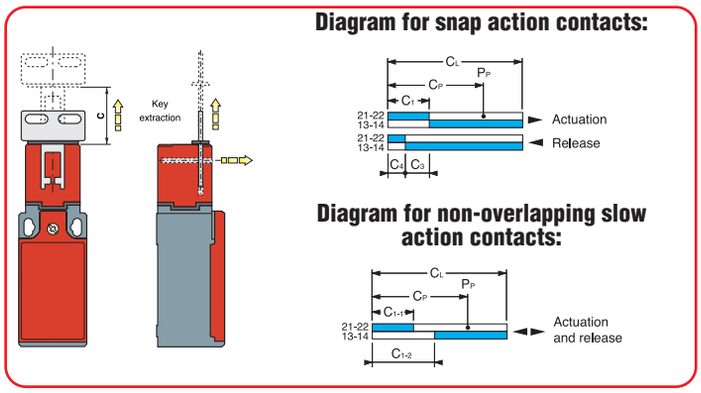
C_P Positive opening travel: minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact.
C_A Latching travel: distance between the free positions P_0 and the latching point S_A.
C_2 Over-travel: distance between the operating position P_A and the max. travel position L.
C_L Max. travel: distance between the free position P_0 and the max. travel position L.
C_3 Differential travel (C1-C4): travel difference of the switch actuator between the operating position P_A and the release position P_R.
C_4 Release travel: distance between the release position P_R and the free position P_0.

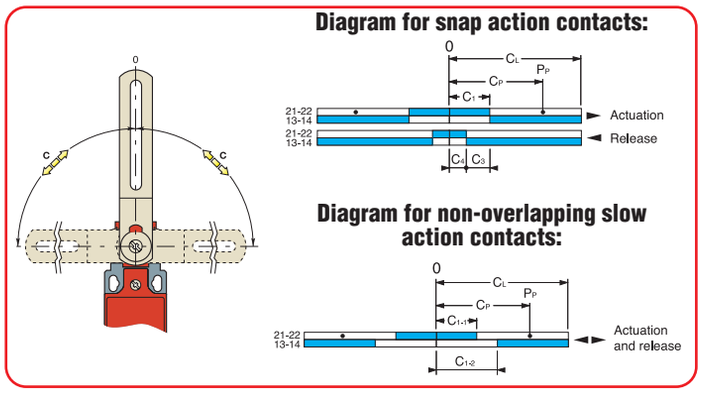
Note: for slow action contacts, $C_3 = 0$, C_{1-1} = pre-travel of contact 21-22, C_{1-2} = pre-travel of contact 13-14

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

			R11 Steel plunger with reset	R13 Steel plunger with nylon roller with reset	R31-R32 Steel plunger with nylon roller with reset	R38 Steel plunger with nylon roller with reset	R41 Lever with nylon roller with reset
Z11:	Snap action 1NO+1NC	13 21 14 22	0 2.7 4.1 5.6 mm 1.6 R 4.2	0 3.1 7.6 9.6 mm 5.0 R 8.0	0 5.8 14.5 21.0 mm 5.2 R 16.5	0 14.0 23.2 32.0 mm 8.2 R 25.7	0 37° 47° 74° 23° R 62°
X11:	Slow action break before make 1NO+1NC	13 21 14 22	0 1.6 3.2 5.6 mm 2.6 R 4.2	0 3.3 8.0 9.6 mm 4.9 R 8.0	0 6.1 10.5 21.0 mm 9.1 R 16.5	0 10.9 18.5 32.0 mm 16.1 R 25.7	0 22° 37° 74° 35° R 62°
Y11:	Slow action make before break 1NO+1NC	13 21 14 22	0 2.9 4.5 5.6 mm 1.5 R 4.2	0 5.3 8.2 9.6 mm 3.0 R 8.0	0 10.2 14.6 21.0 mm 5.4 R 16.5	0 16.8 25.1 32.0 mm 9.4 R 25.7	0 35° 51° 74° mm 18° R 62°
W02:	Simultaneous slow action 2NC	11 21 12 22	0 1.6 3.1 5.6 mm R 4.2	0 3.1 5.9 9.6 mm R 8.0	0 6 10.2 21.0 mm R 16.5	0 10.1 17.6 32.0 mm R 25.7	0 20° 37° 74° R 62°
Z02:	Snap action 2NC	11 21 12 22	0 2.5 4.0 5.6 mm 1.3 R 4.2	0 2.5 7.4 9.6 mm 4.7 R 8.0	0 9.1 13.1 21.0 mm 5.1 R 16.5	0 15.1 22.6 32.0 mm 8.5 R 25.7	0 37° 46° 74° 20° R 62°
X12P:	Slow action break before make 1NO+2NC	11 21 33 12 22 34	0 1.8 3.4 5.6 mm 3.3 R 4.2	0 3.6 6.4 9.6 mm 6 R 8.0	0 6.9 11.8 21.0 mm 11 R 16.5	0 12.2 19.7 32.0 mm 19 R 25.7	0 23° 40° 74° 39° R 62°
X21P:	Slow action break before make 2NO+1NC	11 23 33 12 24 34	0 1.8 3.4 5.6 mm 3.3 R 4.2	0 3.6 6.4 9.6 mm 6 R 8.0	0 6.9 11.8 21.0 mm 11 R 16.5	0 12.2 19.7 32.0 mm 19 R 25.7	0 23° 40° 74° 39° R 62°
W03P:	Simultaneous slow action 3NC	11 21 31 12 22 32	0 1.8 3.4 5.6 mm R 4.2	0 3.6 6.4 9.6 mm R 8.0	0 6.9 11.8 21.0 mm R 16.5	0 12.2 19.7 32.0 mm R 25.7	0 23° 40° 74° R 62°

Plastic or Metal Casing - Travel and Operation Diagrams

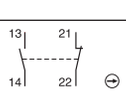
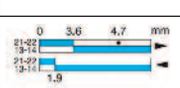
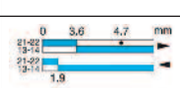
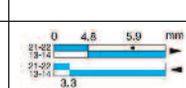
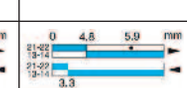
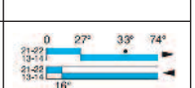
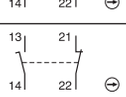
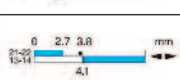
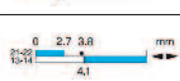
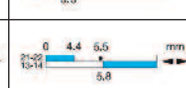
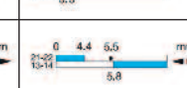
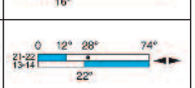
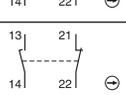
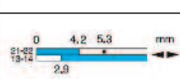
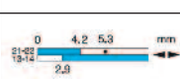
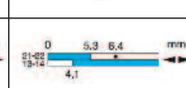
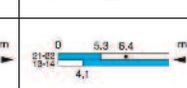
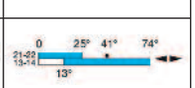
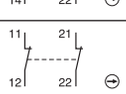
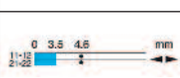
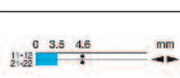
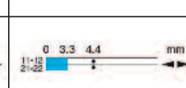
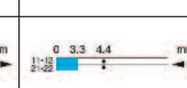
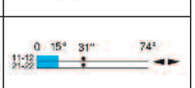
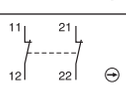
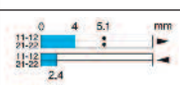
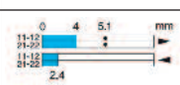
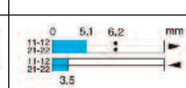
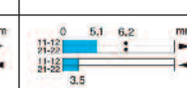
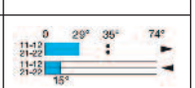
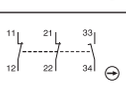
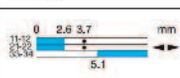
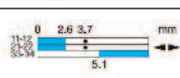
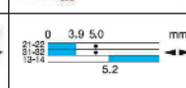
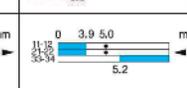
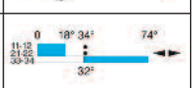
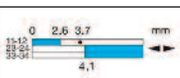
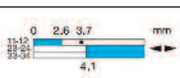
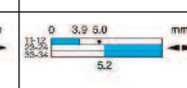
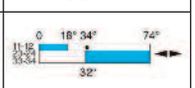
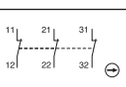
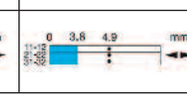
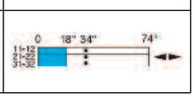




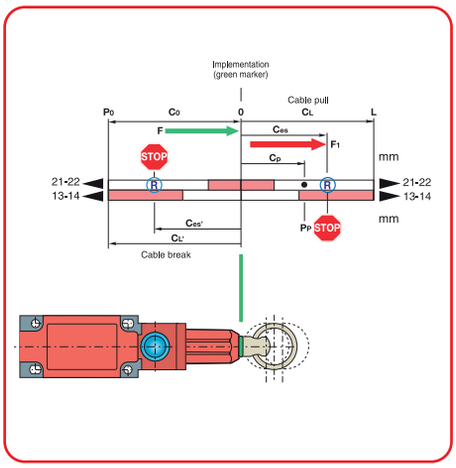
P_0 Free position: position of the switch actuator when no external force is exerted on it.
P_A Operating position: position of the switch actuator, under the effect of force F1, when the contacts leave their initial free position.
P_P Positive opening position: position of the switch actuator from which positive opening is ensured.
L Max. travel position: maximum acceptable travel position of the switch actuator under the effect of a force F1.
P_R Release position: position of the switch actuator when the contacts return to their initial free position.
C_1 Pre-travel: distance between the free position P_0 and the operating position P_A.
C_P Positive opening travel: minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact.
C_2 Over-travel: distance between the operating position P_A and the max. travel position L.
C_L Max. travel: distance between the free position P_0 and the max. travel position L.
C_3 Differential travel (C1-C4): travel difference of the switch actuator between the operating position P_A and the release position P_R.
C_4 Release travel: distance between the release position P_R and the free position P_0.

Note: for slow action contacts, $C_3 = 0$, C_{1-1} = pre-travel of contact 21-22, C_{1-2} = pre-travel of contact 13-14

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

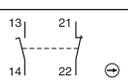
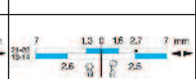
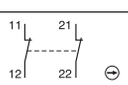
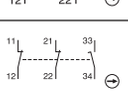
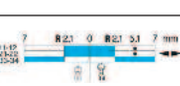
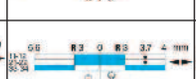
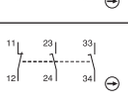
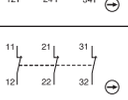
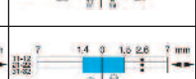
			K10 Adjustable head 90°	K80 Fully turnable head	K3000-K4000 Adjustable head 90°	K5000 Adjustable head 90°	K61-K71-K72 Adjustable head 90°
Z11:	Snap action 1NO+1NC						
X11:	Slow action break before make 1NO+1NC						
Y11:	Slow action make before break 1NO+1NC						
W02:	Simultaneous slow action 2NC						
Z02:	Snap action 2NC						
X12P:	Slow action break before make 1NO+2NC						
X21P:	Slow action break before make 2NO+1NC						
W03P:	Simultaneous slow action 3NC						

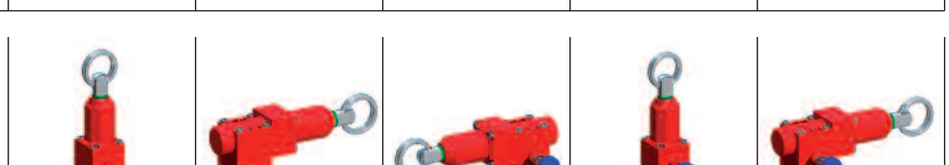
Plastic or Metal Casing - Travel and Operation Diagrams

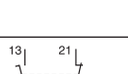
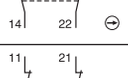
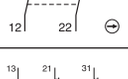
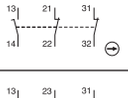
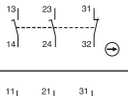


P_0 Free position: position of the switch actuator when no external force is exerted on it.
0 Starting position: position of the switch actuator, under the effect of force F1.
P_P Positive opening position: position of the switch actuator from which positive opening is ensured.
L Max. travel position: 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 0.
C_P Positive opening travel: minimum travel of the switch actuator, from the starting position 0, to ensure positive opening operation of the normally closed contact.
C_{ES}, C_{ES}' Travel for emeregency stop and latching point.
C_L Max. travel: distance between the starting position 0 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

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



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

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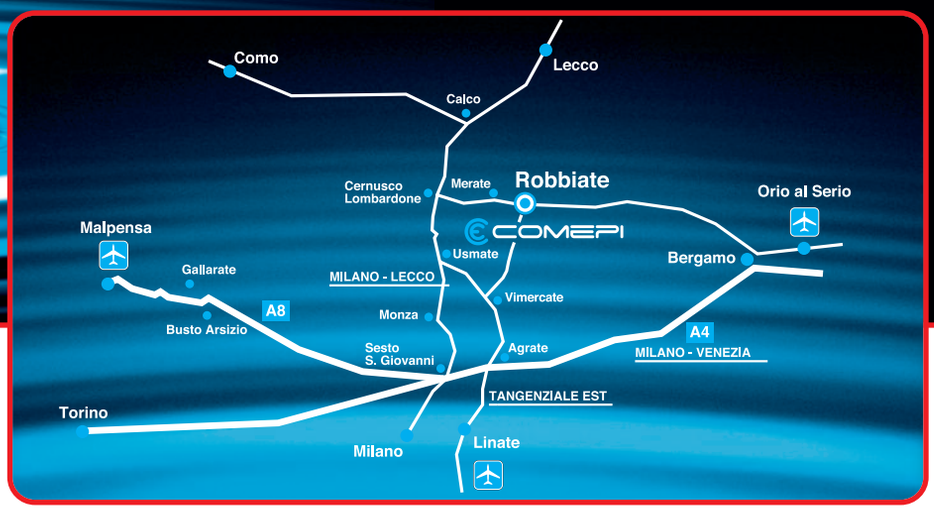

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