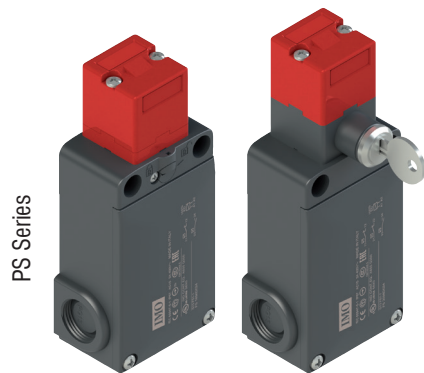


# PS Safety Switches with solenoid and separate actuator

- Polymer housing, three conduit entries
- Protection degree IP67
- 6 contact blocks available
- 6 stainless steel actuators available
- Three supply voltages available
- Auxilliary release device or auxilliary lock release device versions
- Energised or de-energised solenoid versions



Approval UL: E146236



PS Series

## Options & Ordering Codes

Note: The feasibility of a code number does not mean the effective availability of a product

**PS C18 60F 024 - F1 G 20 X40**

### Housing

polymer housing, three conduit entries **PS**

### Contact Blocks

Solenoid operated		Actuator operated	
1NO+1NC			<b>C18</b>
1NO+2NC			<b>C20</b>
3NC			<b>C21</b>
1NO+1NC	1NC		<b>C28</b>
2NC	1NC		<b>C29</b>
1NC	2NC		<b>C30</b>

### Working Principle

locked actuator with de-energised solenoid	<b>60F</b>
locked actuator with energised solenoid	<b>60N</b>
locked actuator with de-energised solenoid with auxilliary lock release device	<b>80F</b>

### Solenoid Supply Voltage

24 VAC/DC (-10%... +25%)	<b>024</b>
120 VAC/DC (-15%... +20%)	<b>120</b>
230 VAC (-15%... +10%)	<b>230</b>

### Preinstalled Cable Glands or Connectors

	no cable gland or connector (standard)
<b>X21</b>	assembled cable gland suitable for Ø 6 to Ø 12mm cable ranges
<b>X40</b>	5 poles M12 assembled metal connector

### Threaded Conduit Entry

	PG 13.5 (standard)
<b>20</b>	M20 x 1.5

### Contact Type

	silver contacts (standard)
<b>G</b>	silver contacts gold plated 1 µm

### Actuators

	without actuator
<b>F</b>	straight actuator
<b>F1</b>	right-angled actuator
<b>F2</b>	jointed actuator
<b>F3</b>	jointed actuator adjustable in two directions
<b>F7</b>	jointed actuator adjustable in one direction
<b>F8</b>	universal actuator

## Specifications

For safety applications up to:	SIL 3 acc. to EN 62061
Interlock with mechanical lock, coded:	PL e acc. to EN ISO 13849-1
Coding level:	type 2 acc. to EN ISO 14119
Safety parameters:	Low acc. to EN ISO 14119
$B_{10d}$ :	Refer to relevant section
Service life:	4,000,000 for NC contacts
Ambient operating temperature:	20 years
Max. actuation frequency:	-25°C ... +60°C
Mechanical endurance:	600 operating cycles <sup>1</sup> /hour
Max. actuation speed:	800,000 operating cycles <sup>1</sup>
Min. actuation speed:	0.5 m/s
Maximum force before breakage $F_{1max}$ :	1 mm/s
	1100 N (head 80D), 900 N (head 98) acc. to EN ISO 14119
Max. holding force $F_{2h}$ :	846 N (head 60F n& 60N), 692 N (head 80D) acc. to EN ISO 14119
Maximum play of locked actuator:	4.5 mm
Released actuator extraction force:	30 N

(1) One operation cycle means two movements, one to close and one to open contacts, as defined in EN 60947-5-1.

## Housing

Housing made of glass fiber reinforced technopolymer, self-extinguishing, shock-proof and with double insulation:

Three knock-out threaded conduit entries:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland having equal or higher protection degree

## Cross section of the conductors (flexible copper wire)

Contact blocks C20, C21, C28, C29, C30:	min. 1 x 0.34 mm <sup>2</sup> (1 x AWG 22)
	max. 2 x 1.5 mm <sup>2</sup> (2 x AWG 16)
Contact block C18:	min. 1 x 0.5 mm <sup>2</sup> (1 x AWG 20)
	max. 2 x 2.5 mm <sup>2</sup> (2 x AWG 14)

## In conformity with standards

IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, EN 61000-6-2, EN 61000-6-3, BG-GS-ET-15, UL 508, CSA 22.2 N. 14.

## In conformity with requirements requested by

Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.

## Positive contact opening in conformity with standards

IEC 60947-5-1, EN 60947-5-1.

## Solenoid

Duty cycle:	100% ED
Solenoid inrush:	20 VA 0.1 s (24 V)
	18 VA 0.1 s (120 V)
	18 VA 0.1 s (230 V)
Solenoid consumption:	4 VA
Medium total consumption:	10 VA
Solenoid protection 24 V:	fuse 500 mA, delayed
Solenoid protection 120 V:	fuse 315 mA, delayed
Solenoid protection 230 V:	fuse 160 mA, delayed

**Notes:** Calculate the power supply using the average solenoid power. Please consider the inrush solenoid power in order to avoid intervention of overload-protection in case of electronic power supply.

## Electrical data

## Utilization category

		Utilization category				
without connector	Thermal current (I <sub>th</sub> ):	10 A	Alternating current: AC15 (50/60 Hz)			
	Rated insulation voltage (U <sub>i</sub> ):	500 VAC 600 VDC	U <sub>e</sub> (V)	250	400	500
	Rated impulse withstand voltage (U <sub>imp</sub> ):	400 VAC 500 VDC (contact blocks C20, C21, C28, C29, C30)	I <sub>e</sub> (A)	6	4	1
		6 kV	Direct current: DC13			
	Conditional short circuit current:	4 kV (contact blocks C20, C21, C28, C29, C30)	U <sub>e</sub> (V)	24	125	250
	Protection against short circuits:	1000 A acc. to EN 60947-5-1	I <sub>e</sub> (A)	6	1.1	0.4
Pollution degree:	type aM fuse 10 A 500 V					
	3					
with MT2 connector 8 poles	Thermal current (I <sub>th</sub> ):	2 A	Alternating current: AC15 (50/60 Hz)			
	Rated insulation voltage (U <sub>i</sub> ):	30 VAC 36 VDC	U <sub>e</sub> (V)	24		
	Protection against short circuits:	type gG fuse 2 A 500 V	I <sub>e</sub> (A)	2		
	Pollution degree:	3	Direct current: DC13			
				U <sub>e</sub> (V)	24	
		I <sub>e</sub> (A)	2			

**Description**

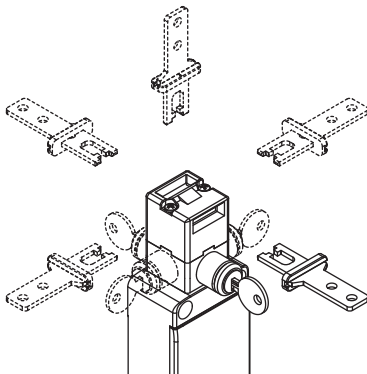


These switches are used on machines where the hazardous conditions remain for a while, even after the machines have been switched off, for example because of mechanical inertia of pulleys, saw disks, parts under pressure or with high temperatures. They can also be used when it is necessary to control machine guards allowing access to protected areas only under specific conditions.

The versions with solenoid actuated NC contacts are considered interlocks with locking in accordance with ISO 14119, and the product is marked on the side with the symbol shown (right).



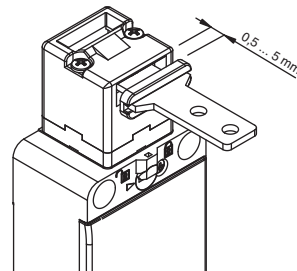
**Orientable head and release device**



The head can be easily turned to each of the four sides of the switch by unfastening the two fixing screws.

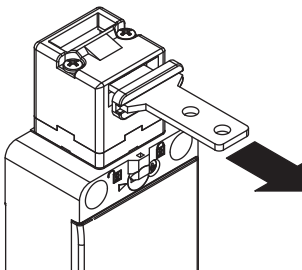
The auxiliary key release device can be rotated in 90° steps enabling the switch to assume 32 different configurations.

**Wide-ranging actuator travel**



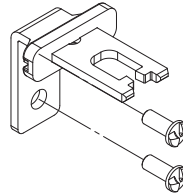
The head of this switch has been designed to have a certain amount of movement tolerance for oscillation along the direction of insertion without causing unwanted machine shutdown caused by switch activation. This feature is available with all door interlock actuators, in order to ensure maximum device reliability.

**Holding force of the locked actuator**



The strong interlocking system guarantees a maximum actuator holding force of  $F_{1max} = 1100 \text{ N}$  (head 60N).

**Safety screws for actuators**



As required by ISO 14119, the actuator must be fixed immovably to the door frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered with using common tools.

**Protection degree IP67**

**IP67**

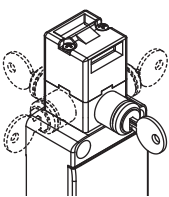
These devices are designed to be used in the toughest environmental conditions and have passed the IP67 immersion test acc. to IEC 60529; and therefore can be used in environments where increased protection of the housing is required.

**Contact blocks**



Contact blocks are supplied with captive screws and finger protection and the twin bridge contacts with double interruption offer increased contact reliability. Versions with gold-plated contacts available. Available in multiple variants activated by actuator or by solenoid.

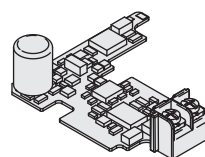
**Key release device with orientable lock**



external side/surface of the machinery remains flat.

The auxiliary key release device is used to allow the maintenance or the entry into the machinery to authorized personnel only. Rotating the key, will activate the solenoid and release the actuator. The device can be rotated allowing for the installation of the safety switch inside the machinery and making the release device accessible outside the protection. In this way, the switch offers improved protection against possible tampering whilst the

**Electronic control board for solenoids power consumption**



This technical solution resolves the problems that may derive from an unstable power supply possibly where the machine is distanced from the main transformers and supply voltage fluctuation between night/day hours, allows for a low power consumption of the solenoid consequently extending the working temperature range of the switch.

**Laser engraving**



All devices are indelibly marked by a dedicated laser system that allows the marking to be also suitable for extreme environments. As this system does not use labels, the loss of plate data is prevented and the marking is more resistant over time.

**Two working principles**

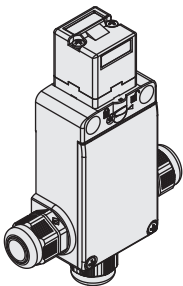
**F or N**

The safety switches with solenoid offer two different operating principles for the actuator locking:

Working principle F: locked actuator with de-energised solenoid. Actuator release is obtained by applying power to the solenoid.

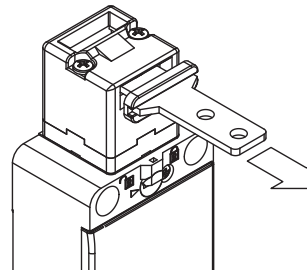
Working principle N: locked actuator with energised solenoid. The release of the actuator is obtained by removal of power to the solenoid. It is advisable to use this version under special conditions because a blackout will allow the immediate opening of the protection.

**Cable outputs**



The switch is equipped with three cable entries in different directions, allowing for its application in series connections or in narrow places.

**Holding force of the unlocked actuator**



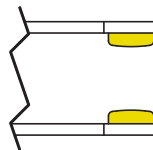
The inside of each switch features a device which holds the actuator in its closed position. Ideal for all those applications where several doors are unlocked simultaneously, but only one is actually opened. The device keeps all the unlocked doors in their position with a retaining force of 30 N~, stopping any vibrations or gusts of wind from opening them.

**Sealable auxiliary release device**



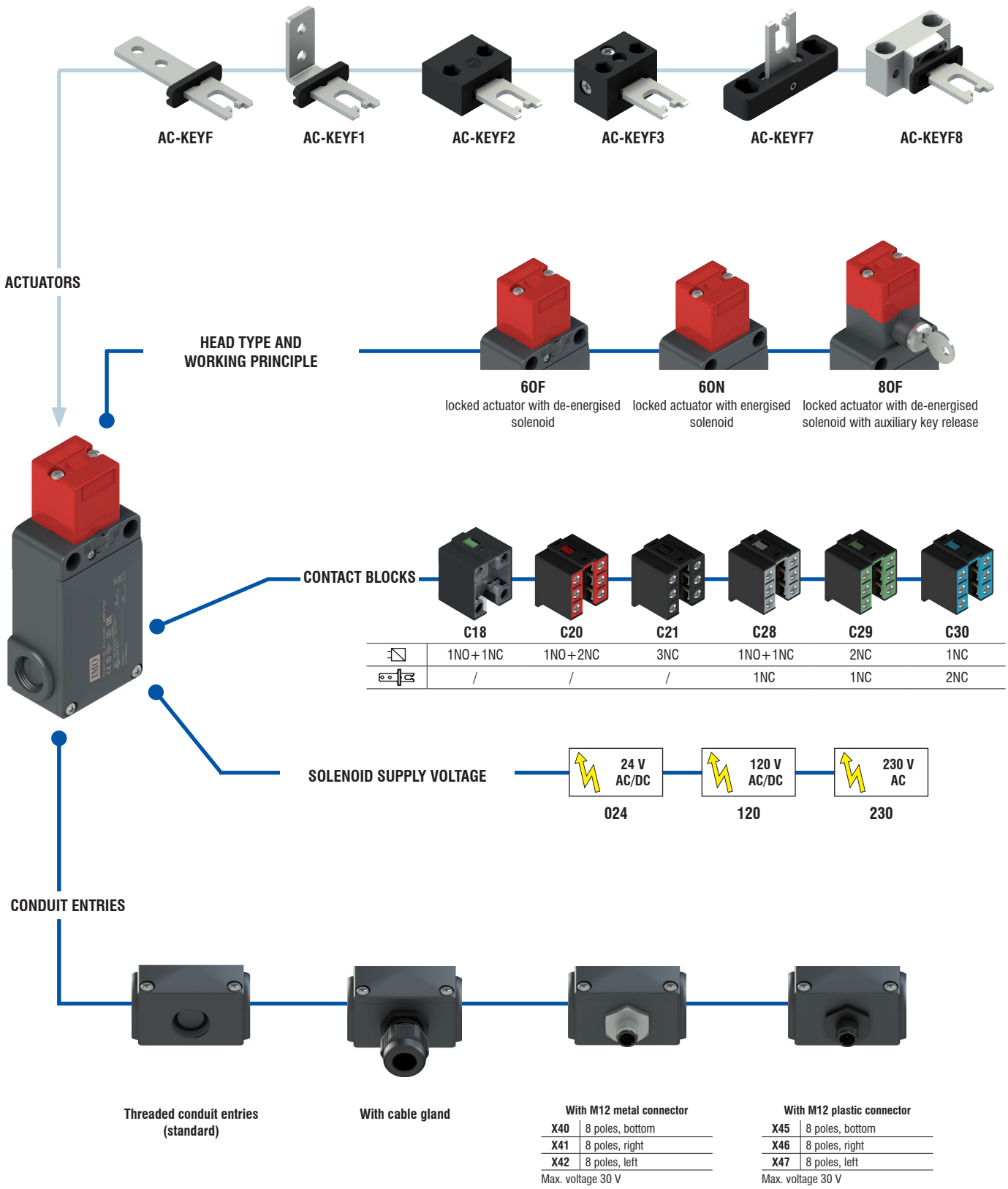
Versions with working principle F are supplied with a sealable auxiliary release device used by technicians during the installation or to access the machine in case of black-out. The auxiliary release device acts on the switch exactly as if the solenoid was energised, actuating therefore also the corresponding electrical contacts but it can only be actuated with the use of tools, thereby ensuring adequate resistance to tampering. If required sealing is possible by means of the hole provided.

**Gold-plated contacts**



The contact blocks of these devices can be supplied gold-plated upon request. It is ideal for applications with low voltages or currents ensuring greater contact reliability. The > 1 micron high-thickness coating ensures electrical endurance of the coating over time.

Selection diagram



● Product option  
 → Accessory sold separately

**Working principle**

The working principle of these safety switches allows three different working states:

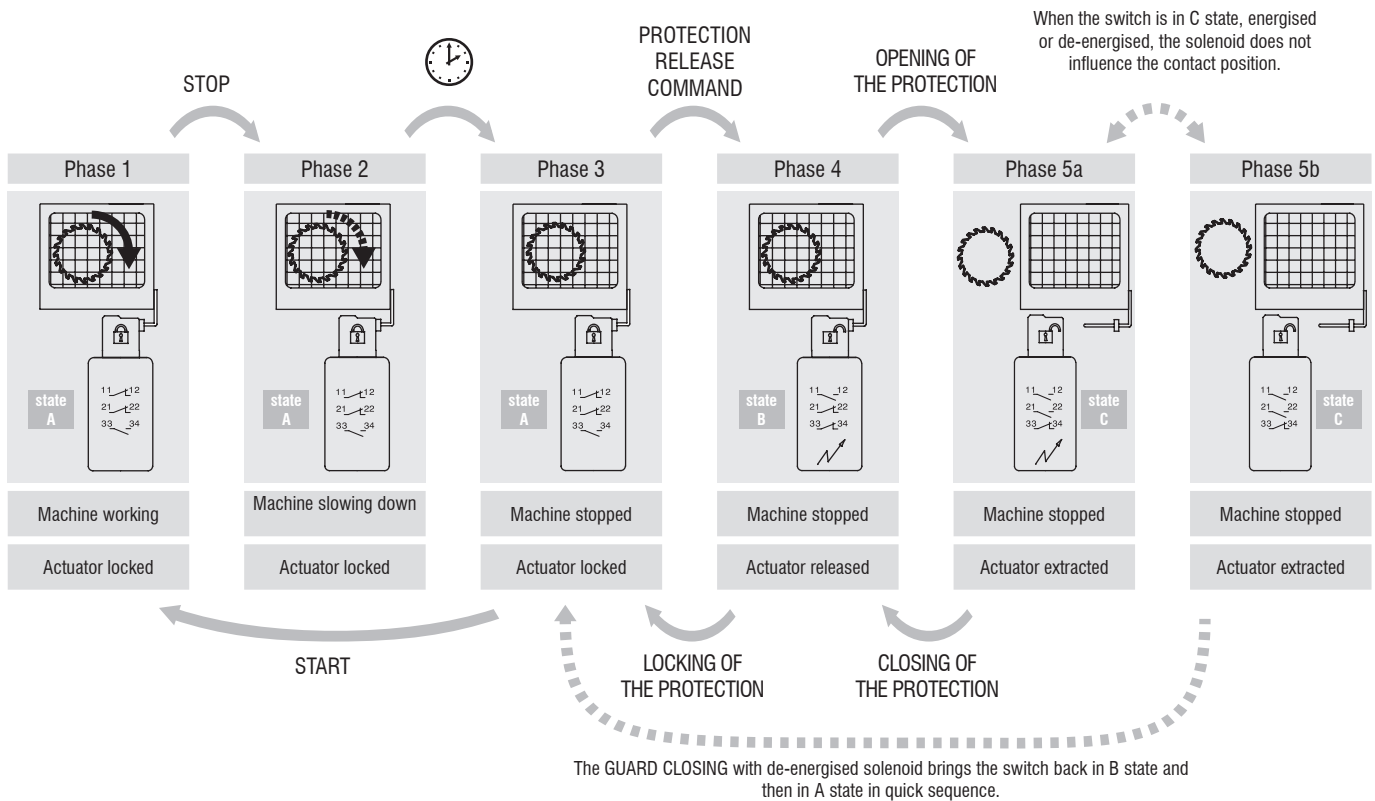
- state A : with inserted and locked actuator
- state B : with inserted actuator, not locked
- state C : with extracted actuator

All or some of these states may be controlled through the positive opening contacts of the internal contact block. In detail, contact blocks that have electric contacts marked with the symbol of the solenoid ( ) are switched in the transition between the state A and state B, while the electric contacts marked with the symbol of the actuator ( ) are switched between state B and state C;

It is also possible to choose between two working principles for the actuator locking:

- **Working principle F:** Actuator locked with de-energised solenoid. Actuator release is obtained by applying power to the solenoid (see example of working cycle steps).
- **Working principle N:** Actuator locked with energised solenoid. The release of the actuator is obtained by removal of power to the solenoid. It is advisable to use this version under special conditions because a blackout will allow the immediate opening of the protection.

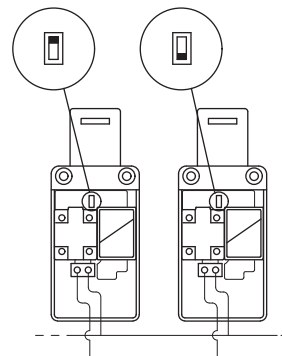
**Example of working cycle steps with PSC2860F024-F1 (switch with working principle F)**



**Installation of two or more switches connected to the same power supply**

**24 V AC/DC versions only**

- This operation is intended to reduce the results of the solenoid inrush current on the power supply and has to be executed only if necessary and with special care.
- Switch off the power supply.
- Open the switch cover.
- Remove the black plastic protection that covers the solenoid by unscrewing the two screws which fix the protection to the switch body.
- Move the dip-switch with a tool so that each switch has a different combination (see figure beside). If more than two switches are installed, repeat the combinations for any next set of two switches.
- Reposition the black plastic protection and tighten the two screws with a torque of 0.8 Nm.



Contact positions related to switch states

Operating state	Working principle F locked actuator with de-energised solenoid			Working principle N locked actuator with energised solenoid		
	state A	state B	state C	state A	state B	state C
Actuator	Inserted and locked	Inserted and released	Extracted	Inserted and locked	Inserted and released	Extracted
Solenoid	De-energised	Energised	-	Energised	De-energised	-

PSC18..... 1NC+1NO controlled by the solenoid		11	11	11	11	11	11	11	11	11	11
		23	23	23	23	23	23	23	23	23	23
PSC20..... 2NC+1NO controlled by the solenoid		11	11	11	11	11	11	11	11	11	11
		21	21	21	21	21	21	21	21	21	21
		33	33	33	33	33	33	33	33	33	33
PSC21..... 3NC controlled by the solenoid		11	11	11	11	11	11	11	11	11	11
		21	21	21	21	21	21	21	21	21	21
		31	31	31	31	31	31	31	31	31	31
PSC28..... 1NO+1NC controlled by the solenoid 1NC controlled by the actuator		11	11	11	11	11	11	11	11	11	11
		21	21	21	21	21	21	21	21	21	21
		33	33	33	33	33	33	33	33	33	33
PSC29..... 2NC controlled by the solenoid 1NC controlled by the actuator		11	11	11	11	11	11	11	11	11	11
		21	21	21	21	21	21	21	21	21	21
		31	31	31	31	31	31	31	31	31	31
PSC30..... 1NC controlled by the solenoid 2NC controlled by the actuator		11	11	11	11	11	11	11	11	11	11
		21	21	21	21	21	21	21	21	21	21
		31	31	31	31	31	31	31	31	31	31

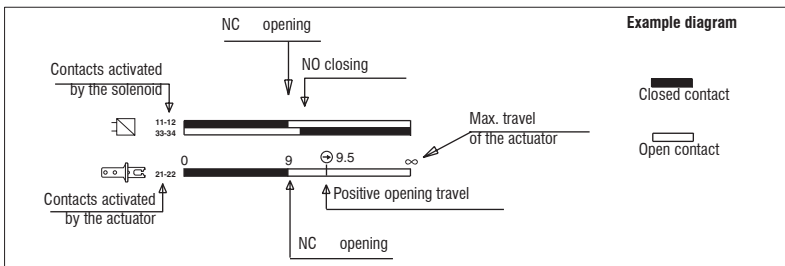
Utilization limits

Do not use where dust and dirt may penetrate in any way into the head and deposit there, in particular where metal dust, concrete or chemicals are spread. Adhere to the EN ISO 14119 requirements regarding low level of coding for interlocks. Do not use in environments where explosive or flammable gas may be present.

**Attention!** These switches alone are not suitable for applications where operators may physically enter the dangerous area, because an eventual closing of the door behind them could restart the machine operation.

How to read travel diagrams

All measures in the diagrams are in mm



IMPORTANT:

NC contact has to be considered with inserted actuator and lock by the solenoid. In safety applications, actuate the switch at least up to the positive opening travel shown in the travel diagrams with symbol ⊕. Operate the switch at least with the positive opening force, indicated between brackets below each article, aside the minimum force value.

Dimensional drawings

All measures in the drawings are in mm

Contact type:

**L** = slow action

Contact blocks

	Working principle F, supplied with sealable auxiliary release device and without actuator	Working principle N, and without actuator	Working principle F, supplied with auxiliary key release and without actuator
C18	<p>PSC1860F024   1NO+1NC</p>	<p>PSC1860N024   1NO+1NC</p>	<p>PSC1880F024   1NO+1NC</p>
C20	<p>PSC2060F024   1NO+2NC</p>	<p>PSC2060N024   1NO+2NC</p>	<p>PSC2080F024   1NO+2NC</p>
C21	<p>PSC2160F024   3NC</p>	<p>PSC2160N024   3NC</p>	<p>PSC2180F024   3NC</p>
C28	<p>PSC2860F024   1NO+2NC</p>	<p>PSC2860N024   1NO+2NC</p>	<p>PSC2880F024   1NO+2NC</p>
C29	<p>PSC2960F024   3NC</p>	<p>PSC2960N024   3NC</p>	<p>PSC2980F024   3NC</p>
C30	<p>PSC3060F024   3NC</p>	<p>PSC3060N024   3NC</p>	<p>PSC3080F024   3NC</p>
Min. force	30 N (40 N )	30 N (40 N )	30 N (40 N )

Legend: With positive opening according to EN 60947-5-1, interlock with lock monitoring in accordance with EN ISO 14119

All options listed above can be ordered complete with the required actuator by adding suffix '-xx' where xx can be one of the options under the header 'Actuator' on the 'Options and Ordering Codes' section.

Accessories

Article	Description
AC-KB1	<p>Actuator entry locking device</p> <p>Padlockable device to lock the actuator entry in order to prevent from the accidental closing of the door behind operators while they are inside the protected area. Hole diameter for padlocks 9 mm.</p>

Article	Description
AC-KLA371	<p>Set of two locking keys</p> <p>Extra copy of the locking keys to be purchased if further keys are needed (standard supply 2 units). The keys of all switches have the same code. Other codes on request.</p>



**Stainless steel actuators**

All measures in the diagrams are in mm

**IMPORTANT:** These actuators can be used with items of the LD, LP, LL, LC and PS series only (e.g. PSC1860F024).  
Low level of coding acc. to EN ISO 14119.

Article	Description
AC-KEYF	Straight actuator

Article	Description
AC-KEYF1	Angled actuator

Article	Description
AC-KEYF2	Jointed actuator

Article	Description
AC-KEYF3	Actuator adjustable in two directions

The actuator can flex in four directions for applications where the door alignment is not precise.

Actuator adjustable in two directions for doors with reduced dimensions.

Article	Description
AC-KEYF7	Actuator adjustable in one direction

Actuator adjustable in one direction for doors with reduced dimensions.

Article	Description
AC-KEYF8	Universal actuator

Joined and two directions adjustable actuator for doors with reduced dimensions.  
The actuator has two couples of fixing holes and it is possible to rotate by 90° the actuator-working plan.

**Accessories for sealing**



Article	Description
AC-FSPB-200	Pack of 200 lead seals
AC-FSPB-10	Pack of 10 lead seals

Article	Description
AC-FSFI-400	400 metre wire roll
AC-FSFI-10	10 metre wire roll

Pliers, steel wire and lead seals used to seal the auxiliary release device (head 60F & 80D).

Article	Description
AC-FSPZ	Pliers