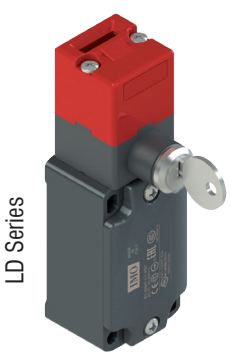
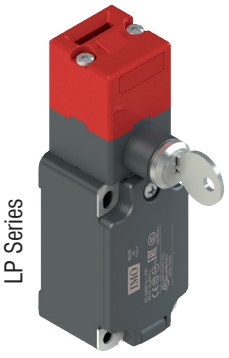
LD-LP Safety Switches
with lock and separate actuator

- Metal housing or technopolymer housing, one conduit entry
- Protection degree IP67
- 9 contact blocks available
- 6 stainless steel actuators available
- Assembled M12 connector version available
- Gold-plated silver contacts option
- Strong actuator locking (1000 N)
- Release of the actuator by key





Approval UL: E146236

Options & Ordering Codes

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

LD C18 MR – F1 G 20 X50 V200

Housing

metal housing, one conduit entry	**LD**
polymer housing, one conduit entry	**LP**

Contact Blocks

Contact activated by the lock	*Contact activated by the actuator*	
1NO+1NC		**C18**
1NO+2NC		**C20**
3NC		**C21**
2NO+1NC		**C22**
1NO+1NC	1NC	**C28**
2NC	1NC	**C29**
1NC	2NC	**C30**
1NO+1NC		**C33**
2NC		**C34**

Actuators

without actuator (standard	
straight actuator	**F**
right-angled actuator	**F1**
jointed actuator	**F2**
jointed actuator adjustable in two directions	**F3**
jointed actuator adjustable in one direction	**F7**
universal actuator	**F8**

Contact Type

	silver contacts (standard)
G	silver contacts gold plated 1 μm

Threaded Conduit Entry

	PG 13.5 (standard)
20	M20 x 1.5

Preinstalled Cable Glands or Connectors

	no cable gland or connector (standard)
X21	assembled cable gland*
X50	5 poles M12 assembled metal connector

* Other glands and connectors available upon request

Threaded Conduit Entry

	one key coding (371) (standard)
V200	up to 50 different key coding numbers

Specifications

For safety applications up to:	SIL 3 acc. to EN 62061 PL e acc. to EN ISO 13849-1
Interlock with mechanical lock, coded:	type 2 acc. to EN ISO 14119
Coding level:	Low acc. to EN ISO 14119
Safety parameters:	
B_{10d}:	1,000,000 for NC contacts
Service life:	20 years
Ambient operating temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	500,000 operating cycles[1]
Max. actuation speed:	0.5 m/s
Min. actuation speed:	1 mm/s
Maximum force before breakage $F_{1max:}$	1000 N acc. to EN ISO 14119
Max. holding force F_{Zh}:	770 N according to EN ISO 14119
Max. backlash of the actuator:	4.5 mm
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.

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, BG-GS-ET-15, UL 508, CSA 22.2 No.14 .

Housing

LP series housing made of glass fiber reinforced technopolymer, self-extinguishing, shock-proof and with double insulation: ⧈

LD series: metal housing, baked powder coating.
Metal head, coated with baked epoxy powder.

One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland having equal or higher protection degree

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.

Cross section of the conductors (flexible copper wire)

Contact blocks C20, C21, C22, C28, C29, C30, C33, C34:	min. 1 x 0.34 mm²	(1 x AWG 22)
	max. 2 x 1.5 mm²	(2 x AWG 16)
Contact block C18:	min. 1 x 0.5 mm²	(1 x AWG 20)
	max. 2 x 2.5 mm²	(2 x AWG 14)

Electrical data

without connector

Thermal current (Ith):	10 A
Rated insulation voltage (Ui):	500 VAC 600 VDC 400VAC 500VDC (contact blocks C20, C21, C22, C28, C29, C30, C33, C34)
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks C20, C21, C22, C28, C29, C30, C33, C34)
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Protection against short circuits:	type aM fuse 10 A 500 V
Pollution degree:	3

Utilization category

Alternating current: AC15 (50/60 Hz)

Ue (V)	250	400	500
Ie (A)	6	4	1

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	6	1.1	0.4

with M12 connector 4 and 5 poles

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 VAC 300 VDC
Protection against short circuits:	type gG fuse 4 A 500 V
Pollution degree:	3

Utilization category

Alternating current: AC15 (50/60 Hz)

Ue (V)	24	120	250
Ie (A)	4	4	4

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	4	1.1	0.4

with M12 connector 8 poles

Thermal current (Ith):	2 A
Rated insulation voltage (Ui):	30 VAC 36 VDC
Protection against short circuits:	type gG fuse 2 A 500 V
Pollution degree:	3

Utilization category

Alternating current: AC15 (50/60 Hz)

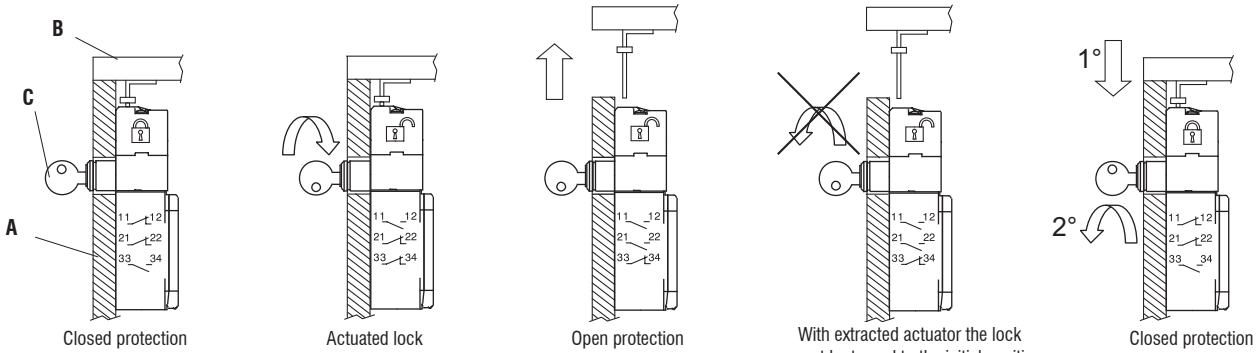
Ue (V)	24
Ie (A)	2

Direct current: DC13

Ue (V)	24
Ie (A)	2

Working cycle (LPC28MR-F1)

The switch is fixed to the machine body (A), while the stainless steel actuator is fastened to the guard (B). Once installed, the switch will firmly lock the actuator. To remove the actuator, it is necessary to unlock the key locking device rotating the key (C). When the actuator is removed, the key cannot be put into the initial position anymore. In the example below is shown how it is possible to have contacts moved by the key lock or by the actuator and how it is possible to install the switch inside the machine, keeping externally visible only the release device.



Closed protection
Actuator locked

Actuated lock
Actuator released

Open protection
Actuator released

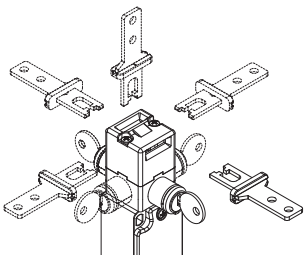
With extracted actuator the lock cannot be turned to the initial position

Closed protection
Actuator locked

Description

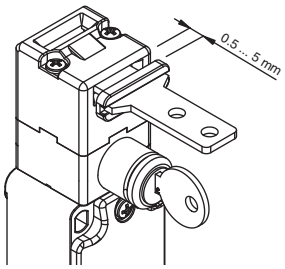
This type of switch can be used on fences or where protection against unauthorised entry is required. They have been designed for the control of large protected areas where operators may physically enter. Supplied with a strong lock, the actuator can be removed from the head only after a complete rotation (180°) of the locking key. During the key rotation, electrical contacts are switched, and the actuator will be released only after the NC contacts are positively opened. Contacts activated by the key locking device will be reset to the initial position only with the actuator inserted and the key in the locking position. **It is impossible to rotate the key when the key locking device is unlocked and the actuator is removed (C state).** These switches 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 quickly 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.

Actuator regulation zone



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.

Protection degree IP67

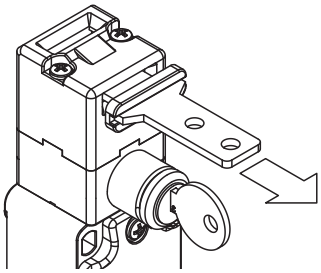
IP67

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 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.

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.

Extended temperature range

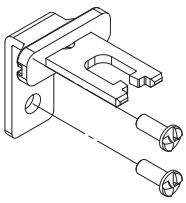
-40°C

This range of switches is also available in a special version with an ambient operating temperature range of -40ºC to +80ºC.
They can be used for applications in cold stores, sterilisers and other devices with low temperature environments. Special materials that have been used to realize these versions, maintain their features under such conditions, widening the installation possibilities.

Laser engraving

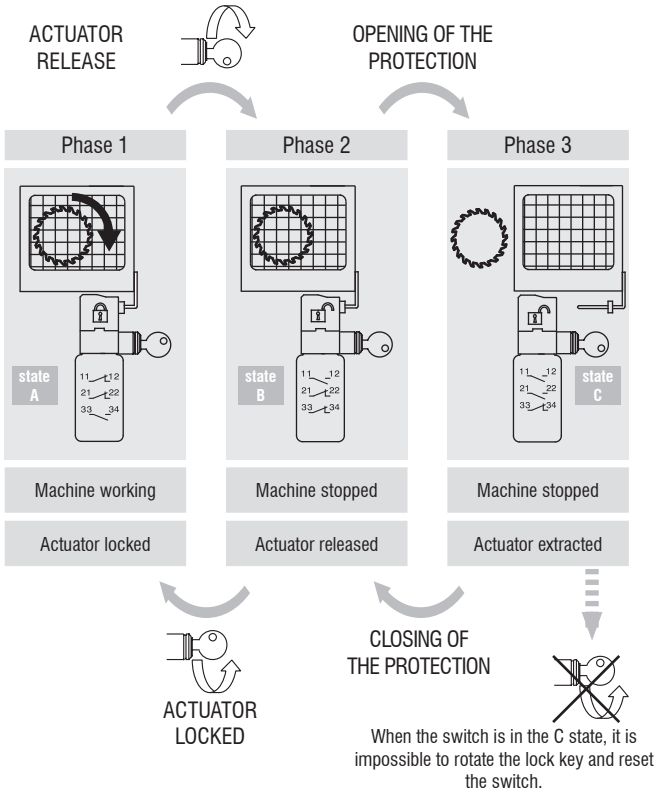
All devices are indelibly marked by a dedicated laser system that allows the marking to be also suitable for extreme environments. As this system does not use labels, the loss of plate data is prevented and the marking is more resistant over time.

Safety screws for actuators



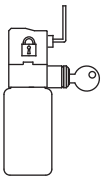
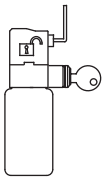
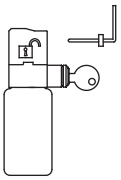
As required by ISO 14119, the actuator must be fixed immovably to the door frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered with using common tools.

Working cycle steps



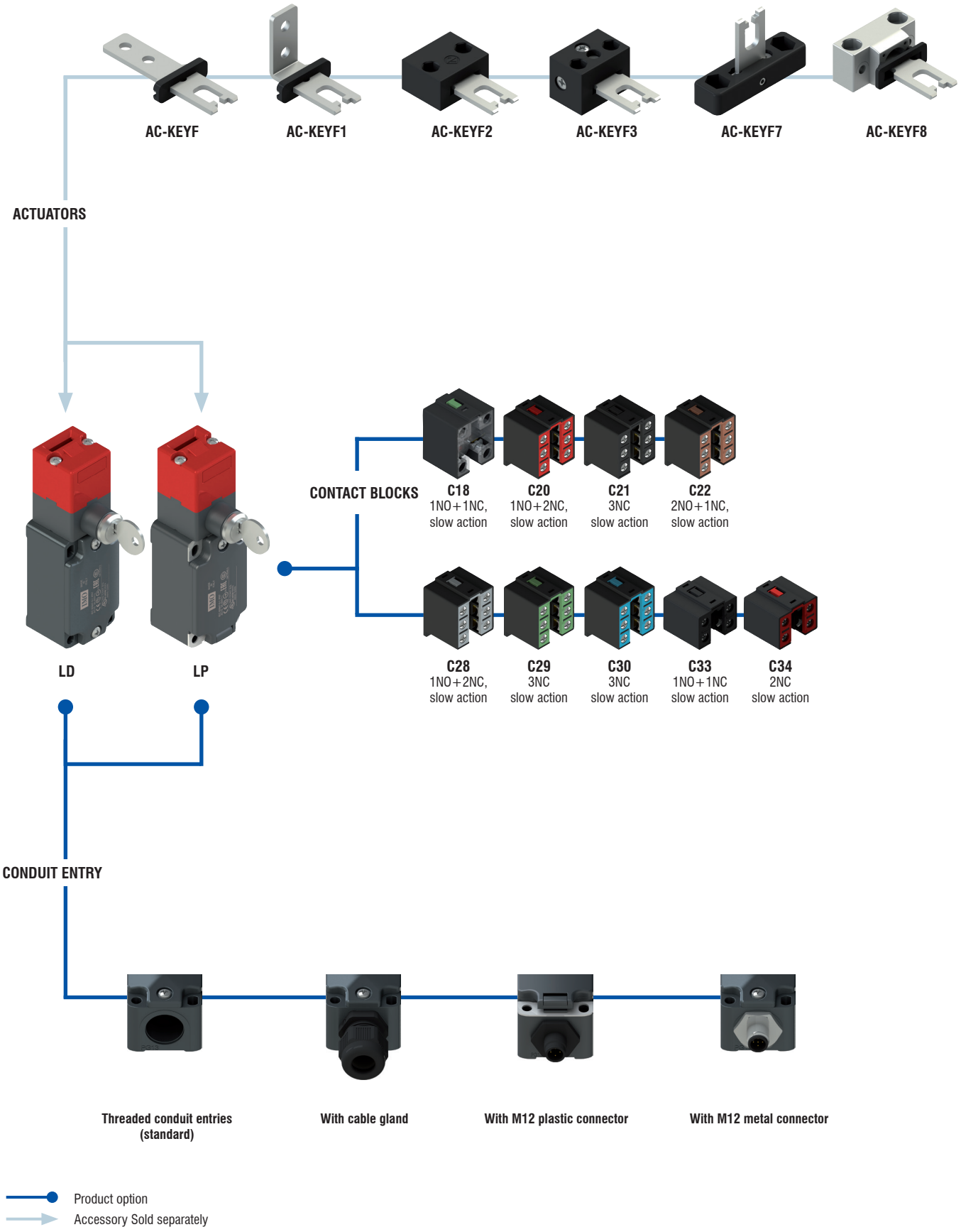
When the switch is in the C state, it is impossible to rotate the lock key and reset the switch.

Contact positions related to switch states

Operating state	state A	state B	state C
Actuator	Inserted and locked	Inserted and released	Extracted
Lock	Closed	Open	Open
Contact blocks			
LDC18MR 1NC+1NO controlled by the lock	11–12 23–24	11 12 23 24	11 12 23 24
LDC20MR 2NC+1NO controlled by the lock	11–12 21–22 33–34	11 12 21 22 33 34	11 12 21 22 33 34
LDC21MR 3NC controlled by the lock	11–12 21–22 31–32	11 12 21 22 31 32	11 12 21 22 31 32
LDC22MR 1NC+2NO controlled by the lock	11–12 23–24 33–34	11 12 23 24 33 34	11 12 23 24 33 34
LDC28MR 1NO+1NC controlled by the lock 1NC controlled by the actuator	11–12 21–22 33–34	11 12 21 22 33 34	11 12 21 22 33 34
LDC29MR 2NC controlled by the lock 1NC controlled by the actuator	11–12 21–22 31–32	11 12 21 22 31 32	11 12 21 22 31 32
LDC30MR 1NC controlled by the lock 2NC controlled by the actuator	11–12 21–22 31–32	11 12 21 22 31 32	11 12 21 22 31 32

The key can be extracted from the lock with blocked or released actuator.

Selection diagram



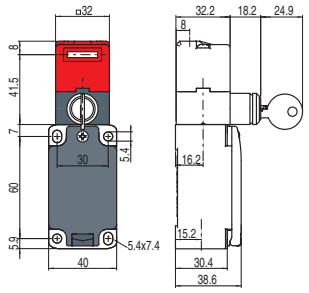
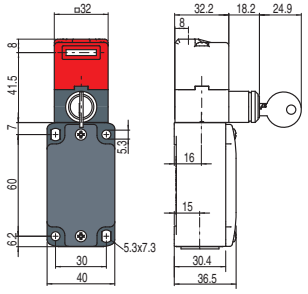
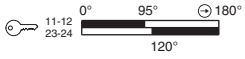
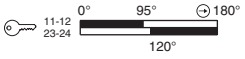
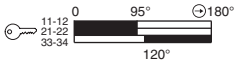
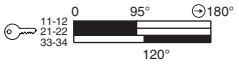
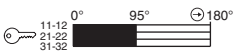
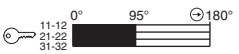
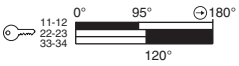
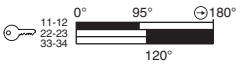
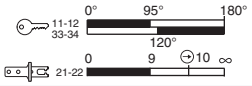
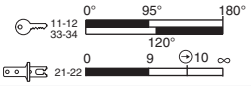
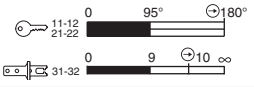
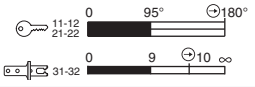
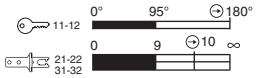
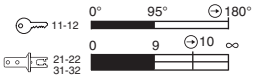
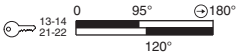
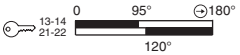
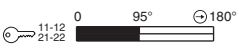
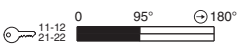
Diagrams for LD Series

All measures in the drawings are in mm

Contact type:

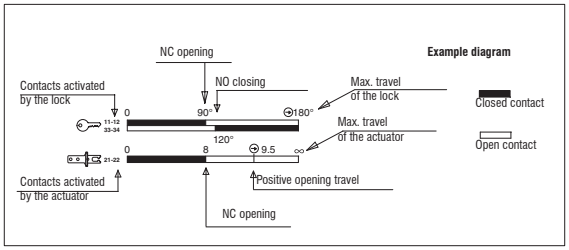
L = slow action

Contact blocks

		Technopolymer housing Without actuator, supplied with two keys	Metal housing Without actuator, supplied with two keys
			
C18	L	LPC18MR 1NO+1NC	LDC18MR 1NO+1NC
			
C20	L	LPC20MR 1NO+2NC	LDC20MR 1NO+2NC
			
C21	L	LPC21MR 3NC	LDC21MR 3NC
			
C22	L	LPC22MR 2NO+1NC	LDC22MR 2NO+1NC
			
C28	L	LPC28MR 1NO+2NC	LDC28MR 1NO+2NC
			
C29	L	LPC29MR 3NC	LDC29MR 3NC
			
C30	L	LPC30MR 3NC	LDC30MR 3NC
			
C33	L	LPC33MR 1NO+1NC	LDC33MR 1NO+1NC
			
C34	L	LPC34MR 2NC	LDC34MR 2NC
			
Min. force		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

How to read travel diagrams



IMPORTANT:
In this example the initial status is with the inserted actuator and the key turned to the lock position, to lock in the actuator. This example has 1NC+1NO contacts that are activated by the key (⊶) and 1NC by the actuator ( ).

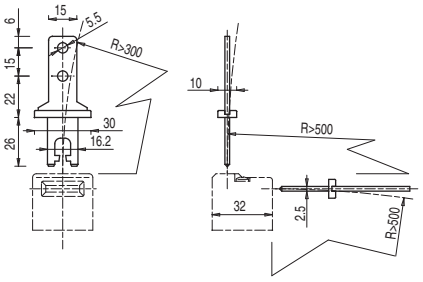
Key:
Turning the key 90° will result in the NC contact to open, a further 30° turn will result in the NO contact to close.

Actuator:
When the actuator is pulled for extraction by 8mm the NC contact opens, a further 1.5mm ensures the positive opening of the contact. The symbol (∞)denotes the fully extracted actuator.

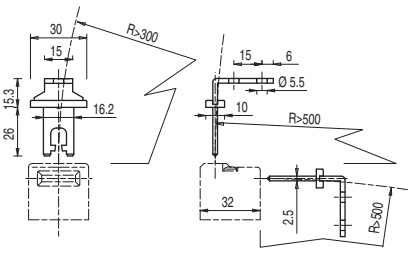
Stainless steel actuators

IMPORTANT: These actuators can be used with items of the LD, LP, LL, LC and LS series only (e.g. LDC18MR).
Low level of coding acc. to EN ISO 14119.

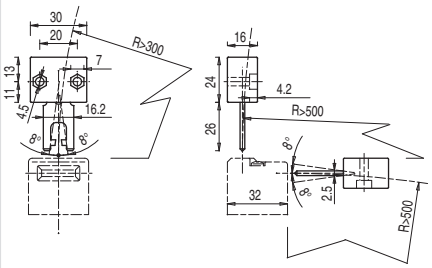
Article	Description
AC-KEYF	Straight actuator



Article	Description
AC-KEYF1	Angled actuator

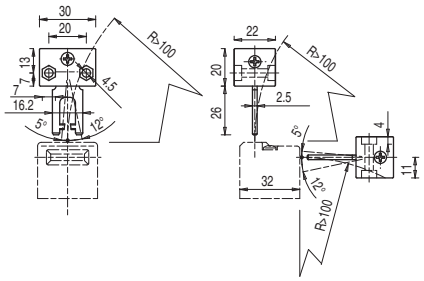


Article	Description
AC-KEYF2	Jointed actuator



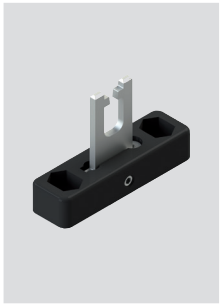
The actuator can flex in four directions for applications where the door alignment is not precise.

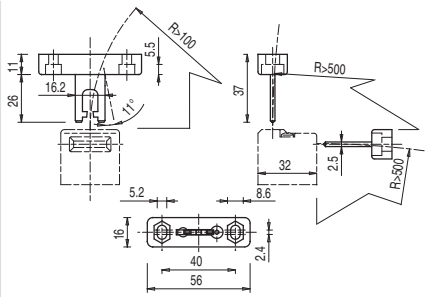
Article	Description
AC-KEYF3	Actuator adjustable in two directions



Actuator adjustable in two directions for doors with reduced dimensions.

Article	Description
AC-KEYF7	Actuator adjustable in one direction



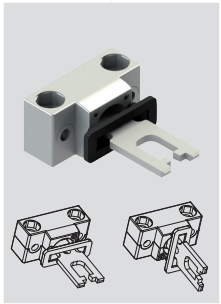


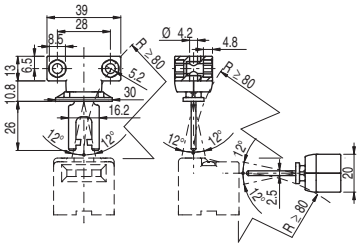
Actuator adjustable in one direction for doors with reduced dimensions.

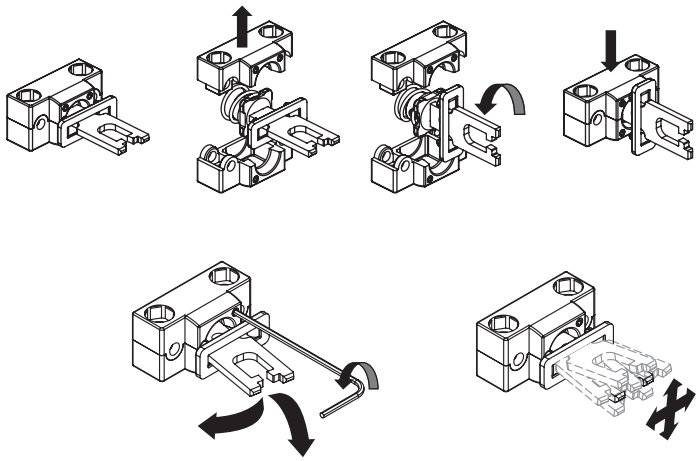
Universal actuator AC-KEYF8

IMPORTANT: These actuators can be used with items of the LD, LP, LL, LC and LS series only (e.g. LDC18MR).
Low level of coding acc. to EN ISO 14119.

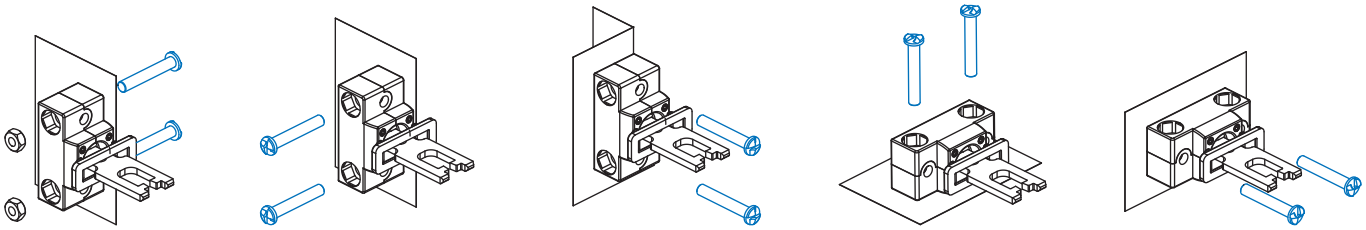
Article	Description
AC-KEYF8	Universal actuator





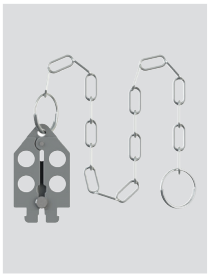


Joined and two directions adjustable actuator for doors with reduced dimensions.
The actuator has two couples of fixing holes and it is possible to rotate by 90° the actuator-working plan.

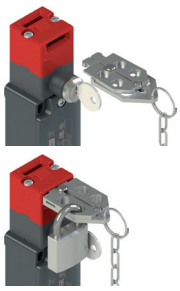


Accessories

Article	Description
AC-KB1	Actuator entry locking device



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 machine.
Hole diameter for padlocks 9 mm.



Article	Description
AC-KLA371	Set of two locking keys

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.