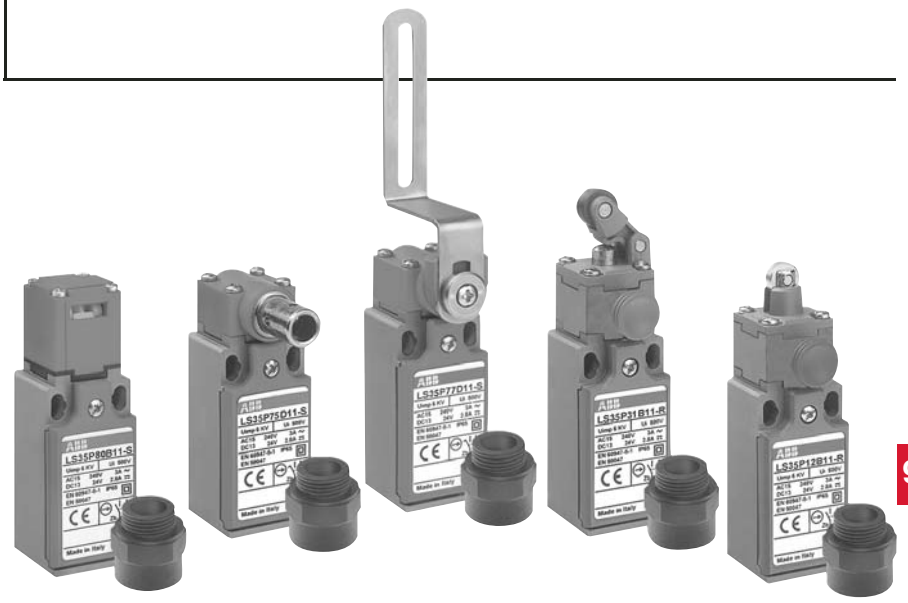
Safety

Limit switches

Safety limit switches
Latch key
Rotative axis
Latch & manual reset



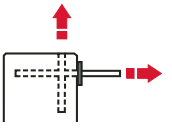
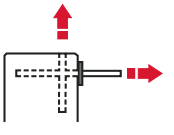
Description of Red Safety Range

30mm limit switches for safety applications, conforming to the IEC/EN 60947-5-1, EN1088 and EN954-1 standards, are available with a red casing in three types:

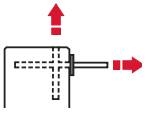
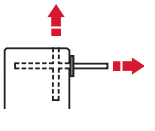
- **Latch key** – The key being straight or with a right angle, with or without shock absorber.
- **Stainless steel rotative axis** – Some limit switches come with a flush mounting lever. They offer double insulation with plastic casing (UL Type 4 (IP65)) and mechanical positive drive.
- **Latch & manual reset range** – These models offer double insulation with a grey plastic casing (UL type 4 (IP65)). Available actuators include plunger, roller plunger, roller lever on plunger and rotary lever.

Selection guide
IP65, UL Type 4
30mm Plastic casing

30mm width — LS35P


CENELEC conformity	LS35P80...-S	LS35P81...-S
Actuating device and actuation type	Translation with small latch (key) and adjustable head	Translation with small latch (key) and pivoting head
		
Positive contact opening		

30mm width — LS35P


CENELEC conformity	LS35P80...-S	LS35P81...-S
Actuating device and actuation type	Galvanized steel rotative axis	Stainless steel rotative axis
		
Positive contact opening		

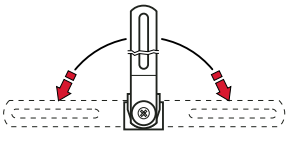
Selection guide
IP65, UL Type 4
30mm Plastic casing

30mm width — LS35P

	LSA30P03	LSA30P04	LSA30P05	LSA30P06	LSA30P07	LSA30P08	LSA30P09
CENELEC conformity	Right angle key 22mm	Straight key 22mm	Right angle key 13mm	Straight key 13mm	Right angle key shock absorber 15mm	Straight key shock absorber 15mm	Adjustable angle key 40mm

30mm width — LS35P

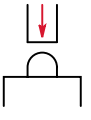
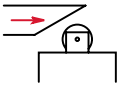
	LS35P77...-S
CENELEC conformity	
Actuating device and actuation type	Galvanized steel flush mounting right angle lever



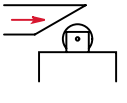
Positive contact opening	

Selection guide
IP65, UL Type 4, latch & manual reset
30mm Plastic casing

30mm width — LS35P

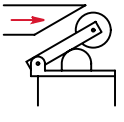
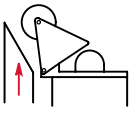
	LS35P11...-R	LS35P12...-R
CENELEC conformity		
Actuating device and actuation type	Galvanized steel plain plunger	Galvanized steel roller plunger
		
Positive contact opening		

30mm width — LS35P

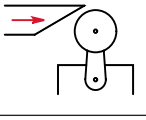
	LS35P13...-R
CENELEC conformity	
Actuating device and actuation type	Galvanized steel plain plunger
	
Positive contact opening	

Selection guide
IP65, UL Type 4, latch & manual reset
30mm Plastic casing

30mm width — LS35P

CENELEC conformity	LS35P31...-R	LS35P12...-R
Actuating device and actuation type	Plastic roller on galvanized steel plunger	Plastic roller lever on galvanized steel plunger
		
Positive contact opening	⊖	⊖

30mm width — LS35P

CENELEC conformity	LS35P13...-R
Actuating device and actuation type	Galvanized steel plain plunger
	
Positive contact opening	⊖

Notes

Latch key safety limit switches

Description

Safety limit switches with small latch (key), made of fibre-glass reinforced UL-V0 thermoplastic material, offer double insulation and a degree of protection IP65. They are equipped with 1 N.C. + 1 N.O. or 2 N.C. contact blocks with dependent action and positive opening operation of the "N.C." contact(s).

Applications

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

- Visible operation.
- 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 (Zb shape).
- 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.
- Associated with other standard limit switches and safety switching devices, they produce automatic control circuits meeting standard EN 954-1.
- They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

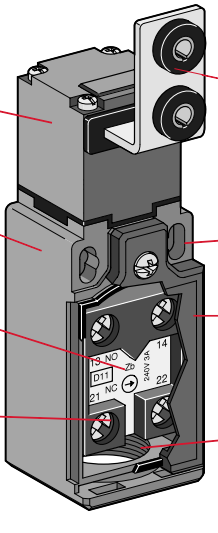
9

2 operating head options:
- Adjustable every 90° (4 x ø 3 screws with (+,-) pozidriv 1 head)
- Pivoting from 0° to 360° (1 x M3 screw with Phillips head No. 1)

Casing
- 30 mm wide with standardised dimensions corresponding to EN 50047

Blocks of 2 contacts
- Contact configuration: 1 N.O. + 1 N.C. or 2 N.C.
- Positive opening operation ⊖
- Contact dependent action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals
- M3.5 screw with (+,-) posidriv 2 head
- Screw heads with captive cable clamps
- Marking conform to IEC 60947-1, IEC 60947-5-1, EN 50005 and EN 50013 standards



7 small latch (key) options to be ordered separately:
- Right angle key (13 or 22 mm fixing)
- Straight key (13 or 22 mm fixing)
- Straight key or right angle key with shock absorber
- Adjustable right angle key

Casing fixing
- 2 x M4 screws in the top part

Cover
- Closure by 1 x ø 3 screw with (+,-) pozidriv 1 head
  Gasket made in one part to prevent tightness breaks

Electrical connection in various options:
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 11 cable gland for LS31P
- 1 x 1/2" NPT adaptor delivered not mounted for LS35P

Catalog explanation

Example : **LS 35 P 80 D11 – S**

Limit Switch ..... LS

Casing width: 30 mm 3

Cable inlet:
1 cable inlet for Pg 13.5 cable gland 0
1 cable inlet for Pg 11 cable gland 1
1 x 1/2" NPT (adaptor) cable inlet 5

Plastic casing ..... P

Operating heads:
Adjustable every 90° 80
Continuously pivoting from 0° to 360° 81

Snap action:
B ..... Zb Snap

Dependent (slow) action:
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

Contact types:
11 ..... 1 N.O. + 1 N.C. contacts
02 ..... 2 N.C. contacts

S ..... Safety device

Latch key safety limit switches
30mm

Movement to be detected

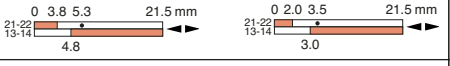
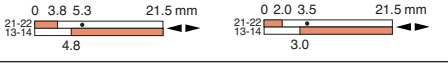
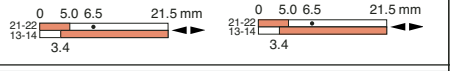
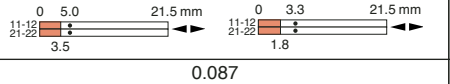
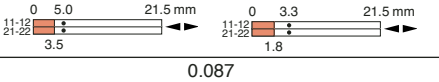
Small Latch (Key), Front or Vertical Translation




Casing

- Plastic
- 30 mm width
- Degree of protection IP65

Actuator

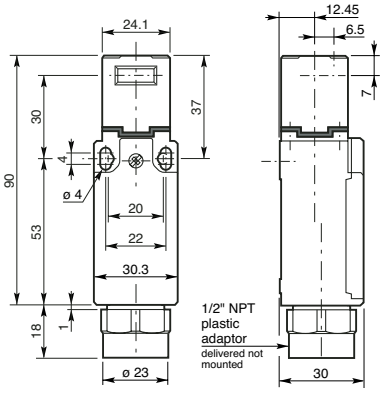
			Right angle key (22 mm mounting)	Straight key (22 mm mounting)
NC contact with positive opening operation			⇒	⇒
Actuation speed: maximal / minimal		m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key		N	15	15
– for extraction of the key		N	10	10
– positive opening operation		N	30	30
Non-overlapping slow action contacts	Catalog number		LS35P80D11-S	LS35P80D11-S
	List price		**$ 43**	**$ 43**
13 21 Zb 14 22	Operation diagram			
Overlapping slow action contacts	Catalog number		LS35P80C11-S	LS35P80C11-S
	List price		**43**	**43**
13 21 Zb 14 22	Operation diagram			
Simultaneous slow action contacts	Catalog number		LS35P80L02-S	LS35P80L02-S
	List price		**43**	**43**
11 21 Zb 12 22	Operation diagram			
Weight with 1/2" NPT adaptor (packing per unit)		kg	0.087	0.087

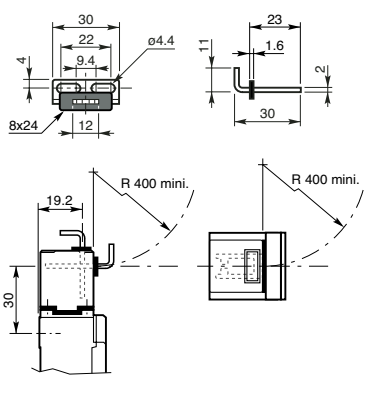
Small Latch (Key)

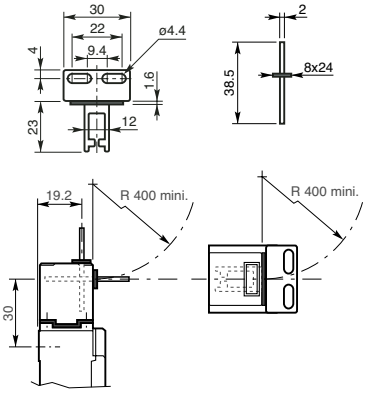
To order separately	Catalog number		LSA30P03	LSA30P04
	List price		**5**	**5**
Weight (packing per unit)		kg	0.009	0.009

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)





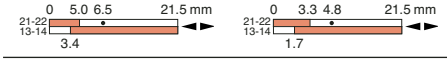
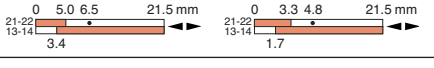
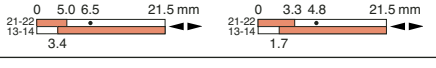
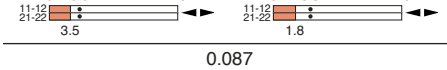
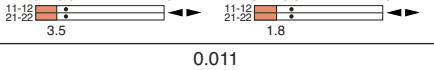
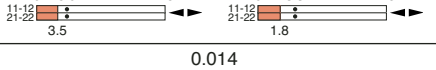


Latch key safety limit switches
30mm

Small latch (key), front or vertical translation

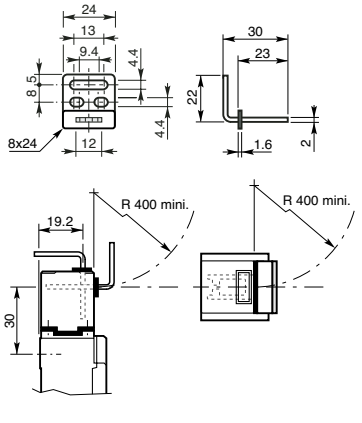
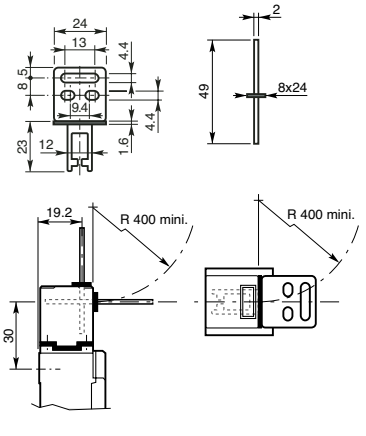
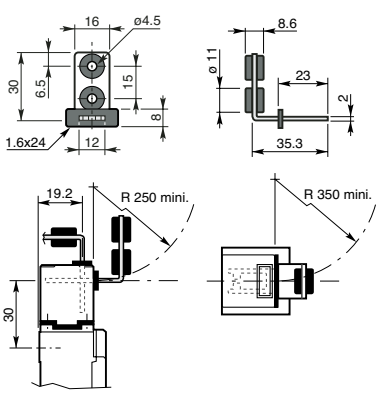





Right angle key (13mm mounting)	**Straight key** (13mm mounting)	**Right angle key with shock absorber**
0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30
LS35P80D11-S **$ 43**	LS35P80D11-S **$ 43**	LS35P80D11-S **$ 43**
		
LS35P80C11-S **43**	LS35P80C11-S **43**	LS35P80C11-S **43**
		
LS35P80L02-S **43**	LS35P80L02-S **43**	LS35P80L02-S **43**
		
0.087	0.011	0.014
LSA30P05 **5**	LSA30P06 **5**	LSA30P07 **9**
0.011	0.011	0.014

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)

Latch key safety limit switches
30mm

Movement to be detected

Small Latch (Key), Front or Vertical Translation




Casing

- Plastic
- 30 mm width
- Degree of protection IP65

Actuator

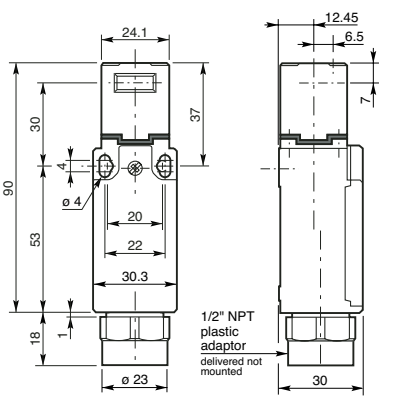
			Right angle key (22 mm mounting)	**Straight key** (22 mm mounting)
NC contact with positive opening operation			⊖	⊖
Actuation speed: maximal / minimal		m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key		N	15	15
– for extraction of the key		N	10	10
– positive opening operation		N	30	30
Non-overlapping slow action contacts	Catalog number		LS35P80D11-S	LS35P80D11-S
	List price		**$ 43**	**$ 43**
13 21 Zb 14 22	Operation diagram		0 3.8 5.3 21.5 mm 21-22 13-14 4.8; 0 2.0 3.5 21.5 mm 21-22 13-14 3.0	0 3.8 5.3 21.5 mm 21-22 13-14 4.8; 0 2.0 3.5 21.5 mm 21-22 13-14 3.0
Overlapping slow action contacts	Catalog number		LS35P80C11-S	LS35P80C11-S
	List price		**43**	**43**
13 21 Zb 14 22	Operation diagram		0 5.0 6.5 21.5 mm 21-22 13-14 3.4; 0 3.3 4.8 21.5 mm 21-22 13-14 1.7	0 5.0 6.5 21.5 mm 21-22 13-14 3.4; 0 3.3 4.8 21.5 mm 21-22 13-14 1.7
Simultaneous slow action contacts	Catalog number		LS35P80L02-S	LS35P80L02-S
	List price		**43**	**43**
11 21 Zb 12 22	Operation diagram		0 5.0 21.5 mm 11-12 21-22 3.5; 0 3.3 21.5 mm 11-12 21-22 1.8	0 5.0 21.5 mm 11-12 21-22 3.5; 0 3.3 21.5 mm 11-12 21-22 1.8
Weight with 1/2" NPT adaptor (packing per unit)		kg	0.087	0.087

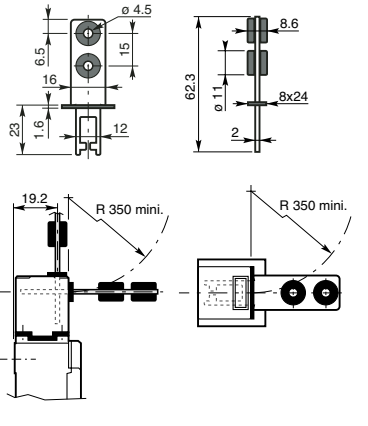
Small Latch (Key)

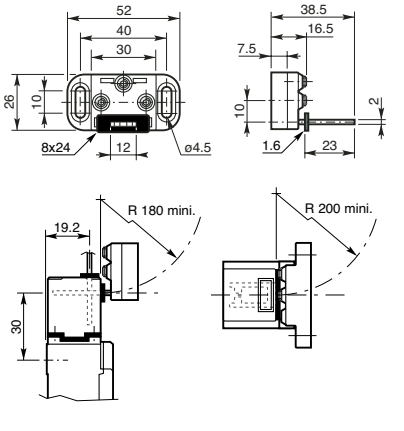
To order separately	Catalog number		LSA30P08	LSA30P09
	List price		**9**	**11**
Weight (packing per unit)		kg	0.014	0.022

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Notes

Latch key safety limit switches
30mm

Movement to be detected

Small Latch (Key), Front or Vertical Translation

Casing

- Plastic
- 30 mm width
- Degree of protection IP65

Actuator

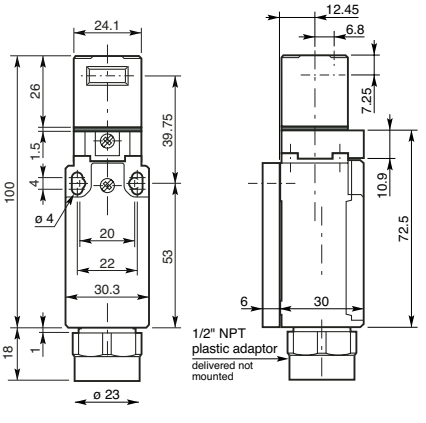
			Right angle key (22 mm mounting)	**Straight key** (22 mm mounting)
"N.C." contact with positive opening operation			→	→
Actuation speed: maximal / minimal		m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key		N	15	15
– for extraction of the key		N	10	10
– positive opening operation		N	30	30
Non-overlapping slow action contacts	Catalog number		LS35P81D11-S	LS35P81D11-S
	List price		**$ 52**	**$ 52**
13 21 Zb 14 22	Operation diagram		0 4.1 5.6 21.5 mm (5.1) / 0 1.9 3.4 21.5 mm (2.9)	0 4.1 5.6 21.5 mm (5.1) / 0 1.9 3.4 21.5 mm (2.9)
Overlapping slow action contacts	Catalog number		LS35P81C11-S	LS35P81C11-S
	List price		**52**	**52**
13 21 Zb 14 22	Operation diagram		0 5.3 6.8 21.5 mm (3.7) / 0 3.2 4.7 21.5 mm (1.6)	0 5.3 6.8 21.5 mm (3.7) / 0 3.2 4.7 21.5 mm (1.6)
Simultaneous slow action contacts	Catalog number		LS35P81L02-S	LS35P81L02-S
	List price		**52**	**52**
11 21 Zb 12 22	Operation diagram		0 5.3 21.5 mm (3.8) / 0 3.2 21.5 mm (1.7)	0 5.3 21.5 mm (3.8) / 0 3.2 21.5 mm (1.7)
Weight with 1/2" NPT adaptor (packing per unit)		kg	0.097	0.097

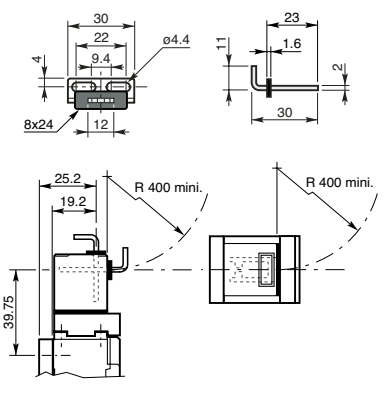
Small Latch (Key)

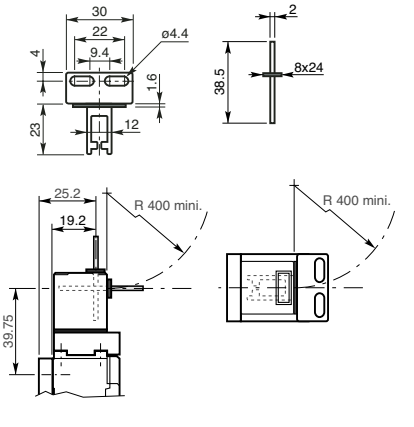
To order separately	Catalog number		LSA30P03	LSA30P04
	List price		**5**	**5**
Weight (packing per unit)		kg	0.009	0.009

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)





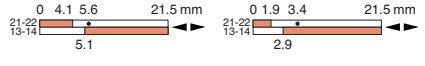
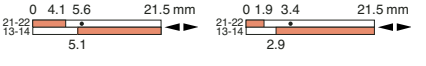
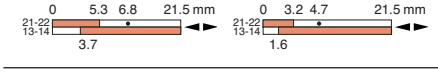
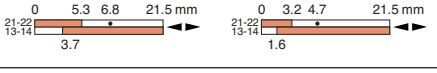
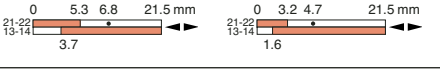


Latch key safety limit switches
30mm

Small Latch (Key), Front or Vertical Translation

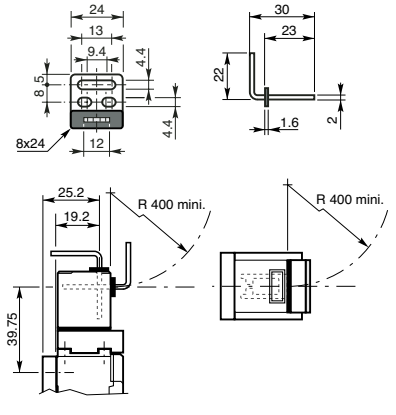


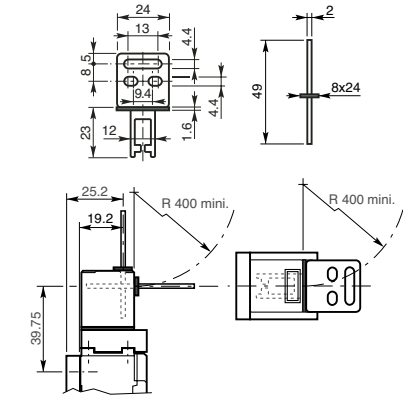


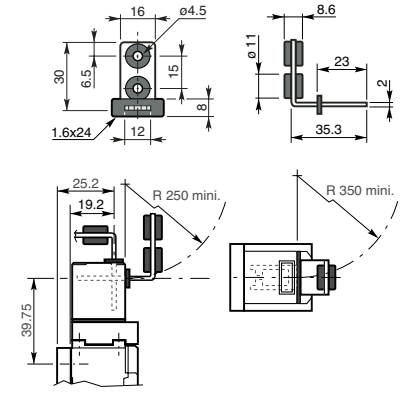

Right angle key (13 mm fixing)	Straight key (13 mm fixing)	Right angle key with shock absorber
0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30
LS35P81D11-S **$ 52**	LS35P81D11-S **$ 52**	LS35P81D11-S **$ 52**
		
LS35P81C11-S **52**	LS35P81C11-S **52**	LS35P81C11-S **52**
		
LS35P81L02-S **52**	LS35P81L02-S **52**	LS35P81L02-S **52**
		
0.097	0.097	0.097
LSA30P05 **5**	LSA30P06 **5**	LSA30P07 **9**
0.011	0.011	0.014

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Latch key safety limit switches
30mm

Movement to be detected

Small Latch (Key), Front or Vertical Translation




Casing

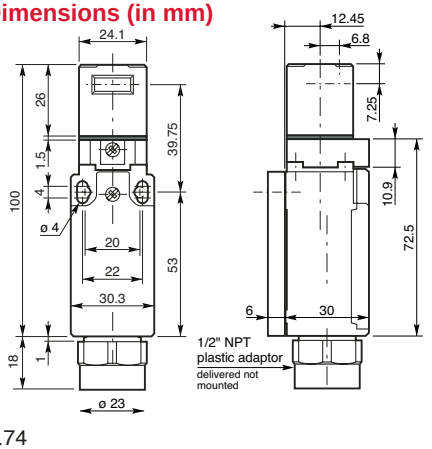
- Plastic
- 30 mm width
- Degree of protection IP65

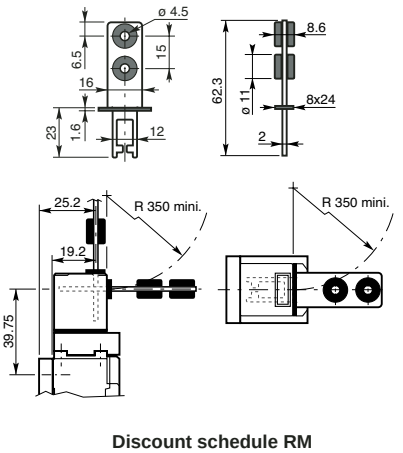
Actuator

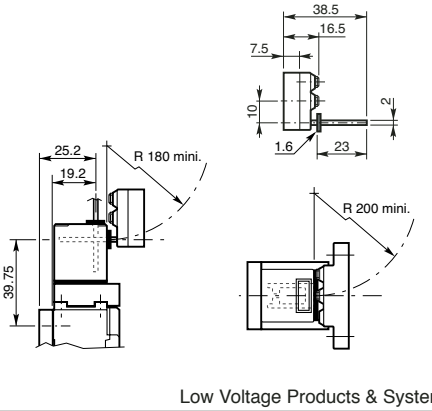
			Straight key with shock absorber	Adjustable angle key
"N.C." contact with positive opening operation			⊖	⊖
Actuation speed: maximal / minimal		m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key		N	15	15
– for extraction of the key		N	10	10
– positive opening operation		N	30	30
Non-overlapping slow action contacts	Catalog number		LS35P81D11-S	LS35P81D11-S
	List price		**$ 52**	**$ 52**
13 21 Zb 14 22	Operation diagram		0 4.1 5.6 21.5 mm / 21-22 13-14 / 5.1 ; 0 1.9 3.4 21.5 mm / 21-22 13-14 / 2.9	0 4.1 5.6 21.5 mm / 21-22 13-14 / 5.1 ; 0 1.9 3.4 21.5 mm / 21-22 13-14 / 2.9
Overlapping slow action contacts	Catalog number		LS35P81C11-S	LS35P81C11-S
	List price		**52**	**52**
13 21 Zb 14 22	Operation diagram		0 5.3 6.8 21.5 mm / 21-22 13-14 / 3.7 ; 0 3.2 4.7 21.5 mm / 21-22 13-14 / 1.6	0 5.3 6.8 21.5 mm / 21-22 13-14 / 3.7 ; 0 3.2 4.7 21.5 mm / 21-22 13-14 / 1.6
Simultaneous slow action contacts	Catalog number		LS35P81L02-S	LS35P81L02-S
	List price		**52**	**52**
11 21 Zb 12 22	Operation diagram		0 5.3 21.5 mm / 11-12 21-22 / 3.8 ; 0 3.2 21.5 mm / 11-12 21-22 / 1.7	0 5.3 21.5 mm / 11-12 21-22 / 3.8 ; 0 3.2 21.5 mm / 11-12 21-22 / 1.7
Weight with 1/2" NPT adaptor (packing per unit)		kg	0.097	0.097
Small Latch (Key)				
To order separately	Catalog number		LSA30P08	LSA30P09
	List price		**9**	**11**
Weight (packing per unit)		kg	0.014	0.022

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)



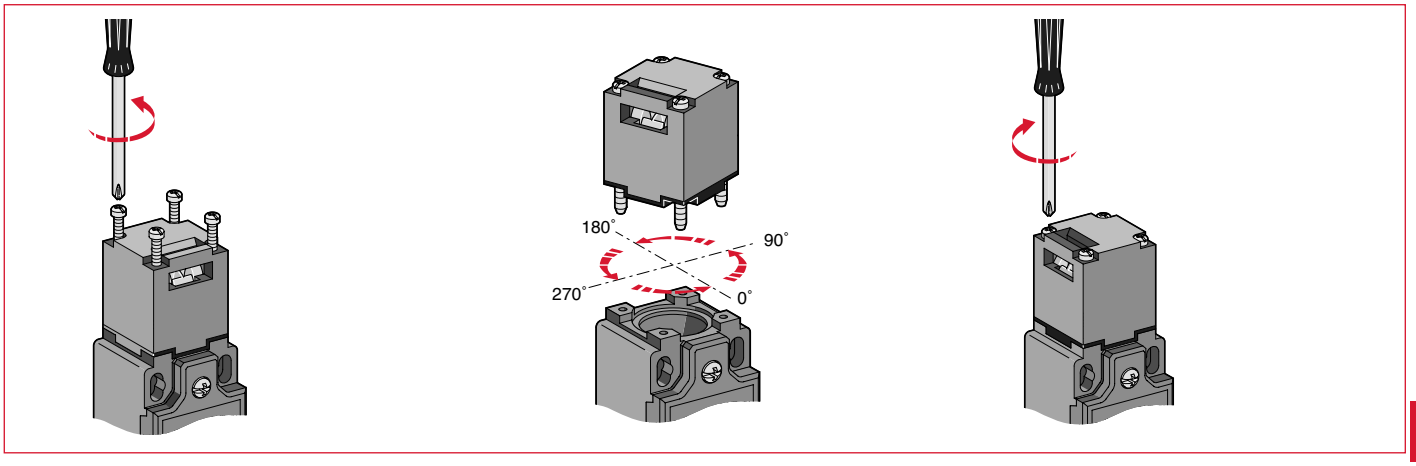




Implementation

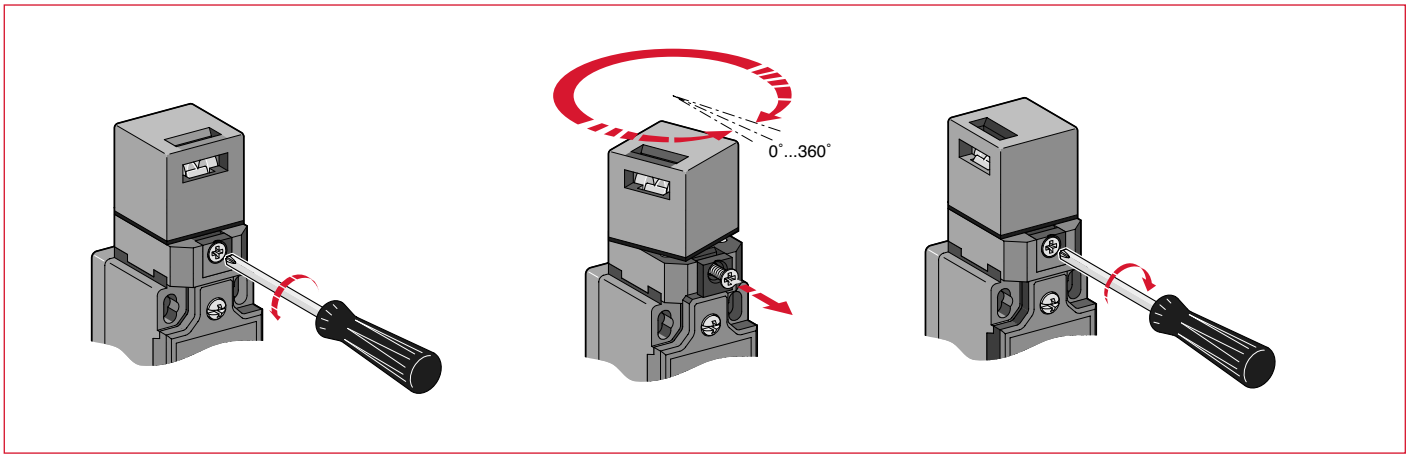
Limit switches with small latch (key) LS30P80...-S, LS31P80...-S and LS35P80...-S

- Head adjustment every 90°.

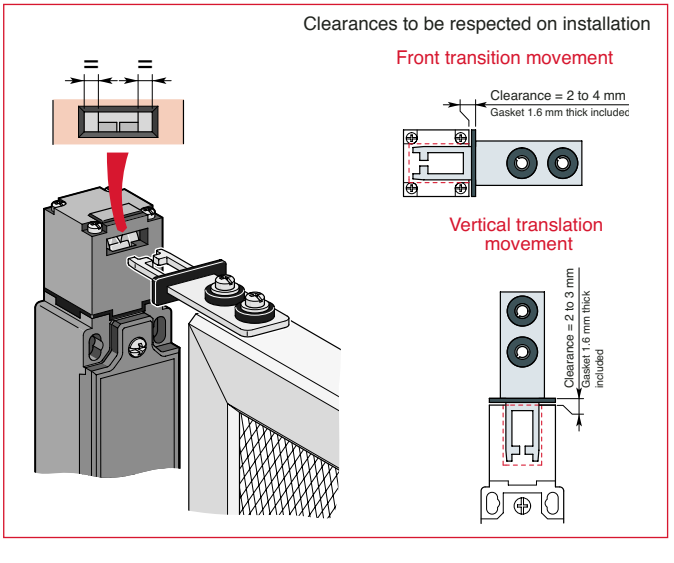


Limit switches with small latch (key) LS30P81...-S, LS31P81...-S and LS35P81...-S

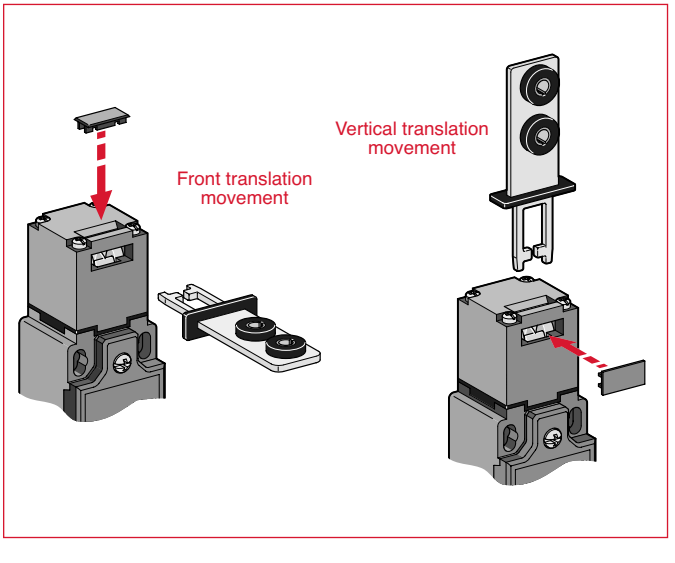
- Pivoting head continuous between 0° to 360°.



Adjusting the small latches (keys)



Blanking off the window not used (IP4x protection)



Notes

Rotative axis limit switches

Description

Safety limit switches made of fibre-glass reinforced UL-V0 thermoplastic material, with rotative axis or flush mounting right angle lever, offer double insulation and a degree of protection IP65. They are equipped with 1 N.C. + 1 N.O. or 2 N.C. contact blocks with dependent action and positive opening operation of the "N.C." contact(s).

Applications

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

- Visible operation.
- Capability for strong current switching (conventional thermal current 10 A).
- Opening of the "N.C." contact(s) for a very small rotation angle: 7°.
- Contact blocks with dependent action and positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖).
- Electrically separated contacts (Zb shape).
- 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.
- Associated with other standard limit switches and safety switching devices, they produce automatic control circuits meeting standard EN 954-1.
- They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

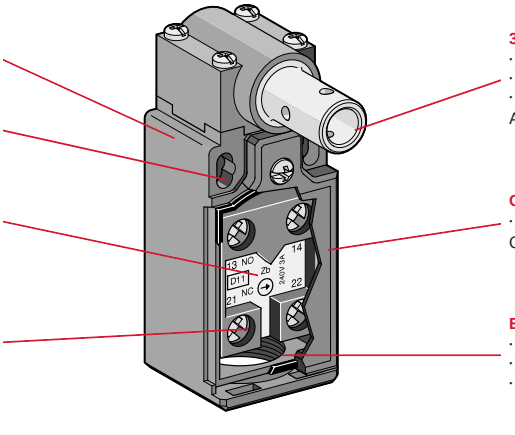
9

Casing
- 30 mm wide with standardised dimensions corresponding to EN 50047

Casing fixing
- 2 x M4 screws in the top part

Blocks of 2 contacts
- Contact configuration: 1 N.O. + 1 N.C. or 2 N.C.
- Positive opening operation ⊖
- Contact dependent action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals
- M3.5 screw with (+,-) posidriv 2 head
- Screw heads with captive cable clamps
- Marking conform to IEC 60947-1, IEC 60947-5-1, EN 50005 and EN 50013 standards



3 operating head options:
- Galvanised steel rotative axis
- Stainless steel rotative axis
- Galvanised steel flush mounting right angle lever

Assembly by 4 x ø 3 screws with (+,-) pozidriv 1 head

Cover
- Closure by 1 x ø 3 screw with (+,-) pozidriv 1 head

Gasket made in one part to prevent tightness breaks

Electrical connection in various options:
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 11 cable gland for LS31P
- 1 x 1/2" NPT adaptor delivered not mounted for LS35P

Catalog number explanation

Example : **LS 35 P 75 D11 S**

Limit Switch ..... LS

Casing width: 30 mm 3

Cable inlet:
1 cable inlet for Pg 13.5 cable gland 0
1 cable inlet for Pg 11 cable gland 1
1 x 1/2" NPT (adaptor) cable inlet 5

Plastic casing ..... P

Operating heads:
Galvanised steel rotative axis 75
Stainless steel rotative axis 76
Galvanised steel flush mounting right angle lever 77

Snap action:
B ..... Zb Snap

Dependent (slow) action:
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

Contact types:
11 ..... 1 N.O. + 1 N.C. contacts
02 ..... 2 N.C. contacts

S ..... Safety device

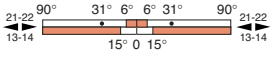
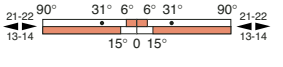
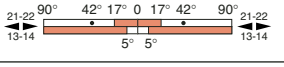
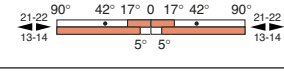
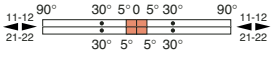
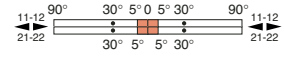
Rotative axis safety limit switches
30mm

Movement to be detected

Angular Around Rotative Axis

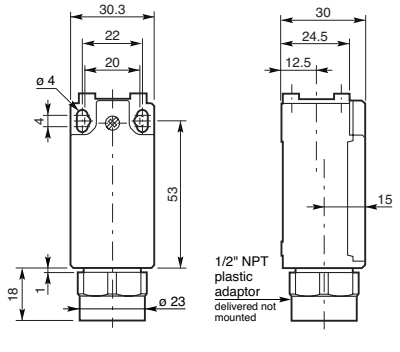
Casing
- Plastic
- 30 mm width
- Degree of protection IP65

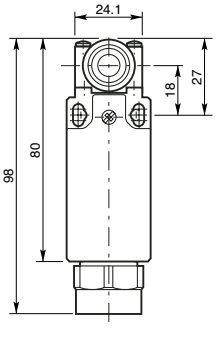
9

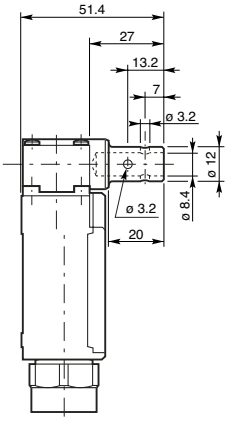
Actuator		Galvanized steel rotative axis	Stainless steel rotative axis
"N.C." contact with positive opening operation		⊖	⊖
Actuation speed: maximal / minimal	m/s	0.5 / 0.01	0.5 / 0.01
Min. torque: – actuation	N.m	0.12	0.12
– positive opening operation	N.m	0.60	0.60
Non-overlapping slow action contacts	Catalog number	LS35P75D11-S	LS35P76D11-S
	List price	**$ 51**	**$ 57**
13 21 Zb 14 22	Operation diagram		
Overlapping slow action contacts	Catalog number	LS35P75C11-S	LS35P76C11-S
	List price	**51**	**$ 57**
13 21 Zb 14 22	Operation diagram		
Simultaneous slow action contacts	Catalog number	LS35P75L02-S	LS35P76L02-S
	List price	**51**	**$ 57**
11 21 Zb 12 22	Operation diagram		
Weight with 1/2" NPT adaptor (packing per unit)	kg	0.097	0.097

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Rotative axis safety limit switches
30mm

Movement to be detected

Angular with Lever

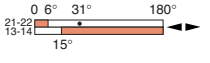
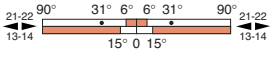
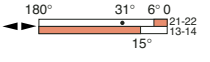
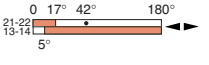
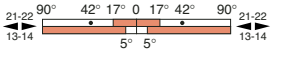
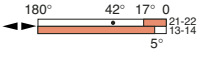
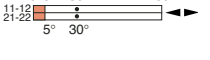
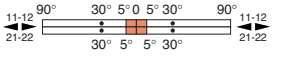
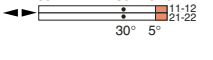
Casing

- Plastic
- 30 mm width
- Degree of protection IP65

Lever adjusted to the left (by user)

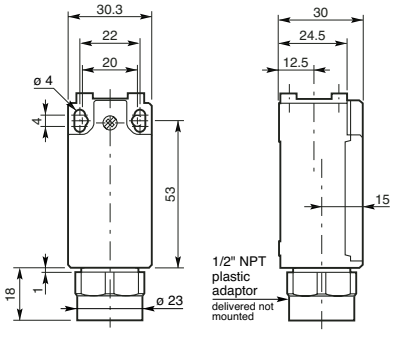
Lever in central position (factory assembled)

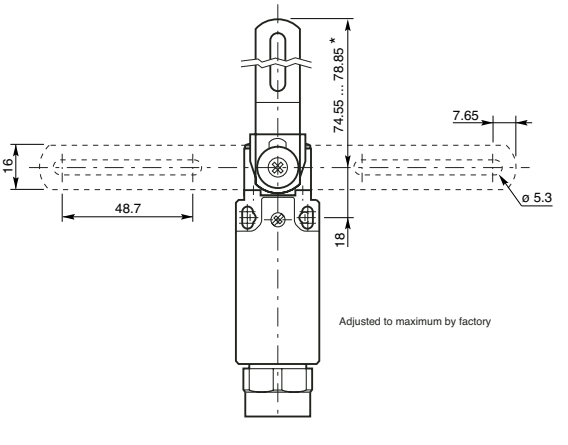
Lever adjusted to the right (by user)

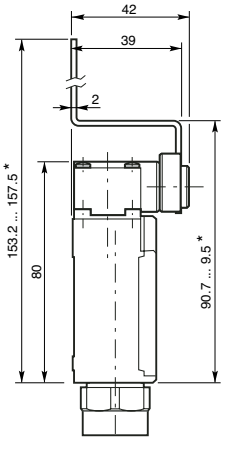
Actuator		Galvanized steel flush mounting right angle lever		
"N.C." contact with positive opening operation ⊕		⊕		
Actuation speed: maximal / minimal	m/s	0.5 / 0.01		
Min. torque: – actuation	N.m	0.12		
– positive opening operation	N.m	0.60		
Non-overlapping slow action contacts	Catalog number	LS35P77D11-S		
	List price	**$ 52**		
	Operation diagram			
Overlapping slow action contacts	Catalog number	LS35P77C11-S		
	List price	**52**		
	Operation diagram			
Simultaneous slow action contacts	Catalog number	LS35P77L02-S		
	List price	**52**		
	Operation diagram			
Weight with 1/2" NPT adaptor (packing per unit)	kg	0.117		

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Rotative axis safety limit switches
Technical data

General Data

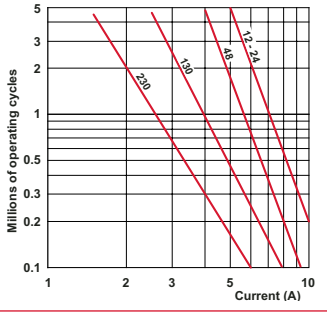
Standards		IEC 60947-1, IEC 60947-5-1, EN 60947-1, EN 60947-5-1, UL 508, and CSA C22-2 No. 14
Certifications - Approvals		UL and CSA
Air temperature near the device – during operation – for storage	 °C °C	 -25 ... +70 -30 ... +80
Climatic withstand		According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions		All positions are authorised
Shock withstand (according to IEC 68-2-27 and EN 60068-2-27) (1/2 sinusoidal shock for 11 ms) no change in contact position	g	Limit switch with small latch (key): 10 g Limit switch with rotative axis or lever: 40 g
Resistance to vibrations	g	5 g (10 ... 500 Hz) no change in position of contacts > 100 μs
Protection against electrical shocks (acc. to IEC 536)		Class II
Degree of protection (according to IEC 529 and EN 60529)		UL Type 4 & IP65
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

Electrical Data

Rated insulation voltage U_i – according to IEC 60947-1 and EN 60947-1 – according to UL 508, CSA C22-2 No. 14			V	 690 (degree of pollution 3) A600, Q600
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)	–		kV	6
Conventional free air thermal current I_{th} (according to IEC 60947-5-1 and EN 60947-5-1) (0 ≤ 40 °C)			A	10
Short-circuit protection - gG type fuses			A	10
Rated operational current				
I_e / AC-15	– acc. to IEC 60947-5-1	24 V - 50/60 Hz	A	10
		130 V - 50/60 Hz	A	5.5
		230 V - 50/60 Hz	A	3.1
		240 V - 50/60 Hz	A	3
		400 V - 50/60 Hz	A	1.8
	– according to UL 508, CSA C22 No.14			A600
I_e / DC-13	– acc. to IEC 60947-5-1	24 V - d.c.	A	2.8
		110 V - d.c.	A	0.6
		250 V - d.c.	A	0.27
	– according to UL 508, CSA C22 No.14	Q600		
Positivity				Contacts with positive opening operation as per IEC 60947-5-1 chapter 3 and EN 60947-5-1
Resistance between contacts			mΩ	25
Mechanical durability		Millions of operations		> 1 million of operating cycles
Max. switching frequency		Cycles/h		600
Electrical durability (according to IEC 60947-5-1 appendice C)				Utilization categories AC-15 and DC-13 (see curves and values below)
– Max. switching frequency – Load factor		Cycles/h		3600 0.5

Electrical durability for AC-15 utilization category

Slow action



Electrical durability for DC-13 utilization category

Slow action

Power breaking for a durability of 5 million operating cycles

Voltage	24 V	12 W
Voltage	48 V	9 W
Voltage	110 V	6 W

Rotative axis safety limit switches
Technical data
Specifications, directives, standards & EC conformity

Definitions
The ABB limit switches listed in this catalogue are developed and manufactured according to the rules set out in IEC international publications and EN European standards. In most countries, the devices are not subject to further obligation for approval. In some countries, however, the law stipulates obligation for approval.

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 Standardization (CENELEC), grouping 18 European countries, publishes EN standards for low voltage industrial apparatus. These European standards vary very little from IEC international standards and use a similar numbering system. The same is true of national standards. Contradicting national standards are withdrawn.
- **Harmonized European Specifications**
  The European Committees for Standardization (CEN and CENELEC), grouping 18 European countries, 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" Authorized 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" Authorized to be included in equipment and for separate sale as "General purpose products" components in the USA.
They bear the mark: .

European Directives
The guarantee of free movement of goods within the European Community assumes elimination of any regulatory differences between the member states. European Directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.
There are three main directives:
- **Low Voltage Directive 73/23/EEC**, amended by Directive 93/68/EEC concerning electrical equipment from 50 to 1000 V a.c. and from 75 to 1500 VDC. This specifies that compliance with the requirements that it sets out is acquired once the equipment conforms to the standards harmonized at European level: EN 60947-1 and EN 60947-5-1 for limit switches.
- **Machines Directives - 89/392/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC** - defining main safety and health requirements concerning design and manufacture of the machines and other equipment including safety components in European Union countries.
- **Electromagnetic Compatibility Directive 89/336/EEC**, amended by Directive 92/31/EEC and Directive 93/68/EEC concerning all electrical devices likely to create electromagnetic disturbances.

Signification of CE marking:
CE marking must not be confused with a quality label.
CE marking placed on a product is proof of conformity with the European Directives concerning the product.
CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

Standards
- **International standards**

IEC 60947-1	Low-voltage switchgear and controlgear – Part 1: General Rules (NFC 63-001).
IEC 60947-5-1	Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices (NFC 63-146) – Chapter 3: Special requirements for control switches with positive opening operation.
IEC 60204-1	Electrical equipment of industrial machines – Part 1: General requirements (≈ NFC 79-130).
IEC 60204-2	Electrical equipment of industrial machines – Part 2: Item designation and examples of drawings, diagrams, tables and instructions (Appendices D and E of Publications IEC 60204-1).

- **European Standards**

EN 50005	Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules (NFC 63-030).
EN 50013	Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number for particular control switches (NFC 63-033).
EN 50041	Low-voltage switchgear and controlgear for industrial use – Control switches – 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 for industrial use – Part 1: General rules (NFC 63-001).
EN 60947-5-1	Low-voltage switchgear and controlgear for industrial use – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices (NFC 63-146) – Chapter 3: Special requirements for control switches with positive opening operation.

- **Harmonized European Standards**
  These standards are common to all European Union and EFTA (European Free Trade Association) countries. They were prepared (prEN project) and written (EN final text) by the European standardization committees CEN or CENELEC.
  Harmonized European standards were drawn up to allow definition of the rules and technical means to be used to satisfy the main safety requirements on machines and thus guarantee conformity with the Machines Directive.
  Compliance with a harmonized European standard is presumption of conformity with the relevant Directive.
  European standards relating to machine safety are divided into groups (A, B and C types).

Type A standards:	basic standards: setting out design principles and the general aspects valid for all machine types.
EN 292-1	Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology.
EN 292-2 and EN 292-2/A1	Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications.
EN 1050	Safety of machinery – Principles for risk assessment.
Type B standards:	group standards:
B1: dealing with specific safety aspects.	
EN 60204-1	Safety of machinery – Electrical equipment of machines – Part 1: General requirements.
EN 954-1	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design.
B2: dealing with components and devices determining safety.	
EN 1088	Safety of machinery – Interlocking devices associated with guards – Principles for design and selection.
Type C standards:	specific standards or standards per machine family giving detailed safety specifications applicable to a machine or to a group of machines.
EN 81-1	Safety rules for the construction and installations of lifts – Part 1: Electric lifts.

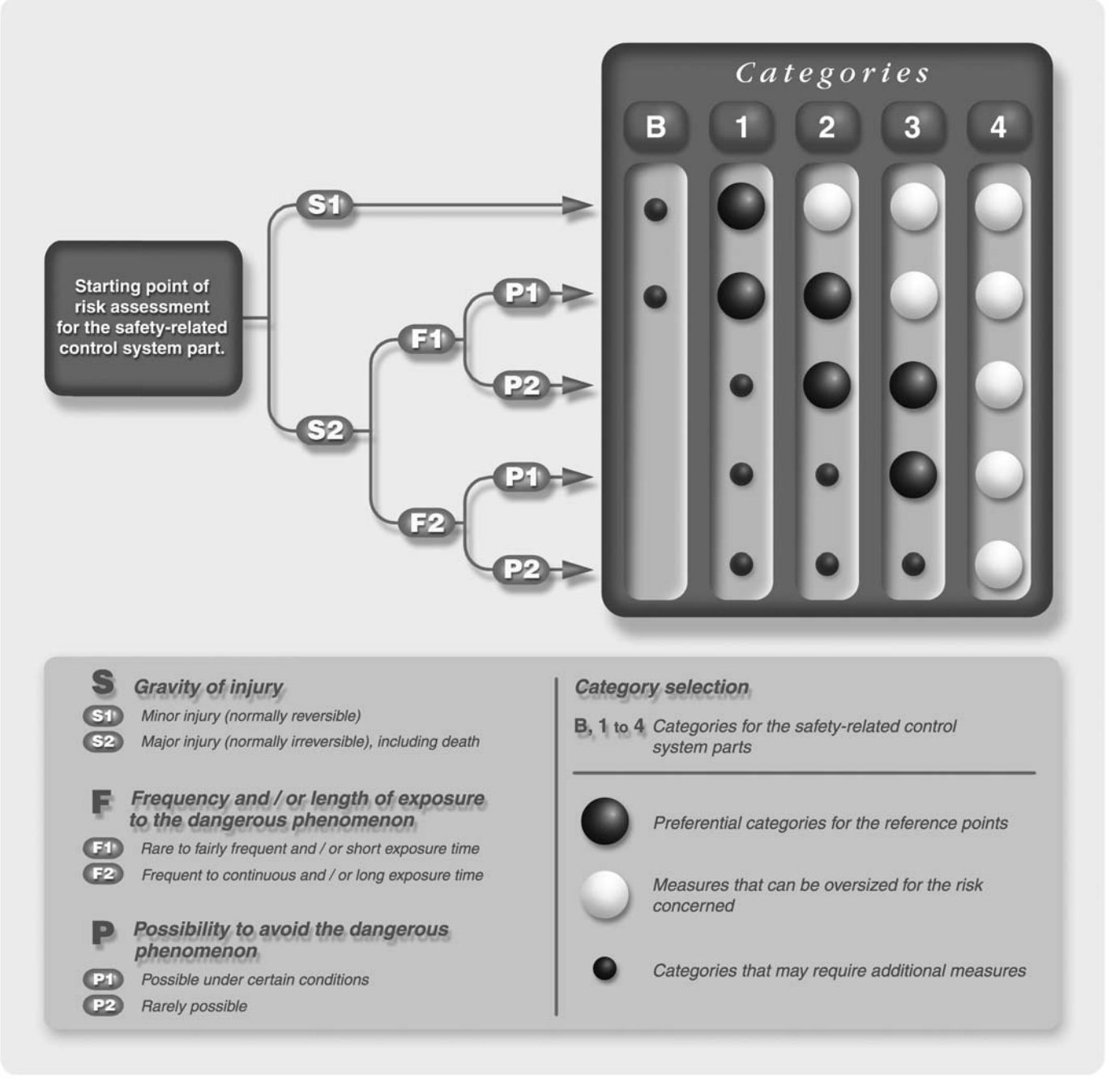
Content of the "EC" Declaration of Conformity for Safety Components
The "EC" Declaration of Conformity is intended to certify that the safety component complies with the main safety and health requirements of Machines Directive 89/392/EEC.
It must contain the following information:
– the name and address of the manufacturer or his representative established in the European Community,
– the description of the safety component (brand, type, serial number, etc.),
– the safety function performed by the safety component if this is not obvious from the description,
– when needed, the name and address of the notified organisation and the number of the type "CE" certificate,
– when needed, the name and address of the notified organisation to which the file has been sent as per article 8, paragraph 2, point c), first hyphen,
– when needed, the name and address of the notified organisation who performed the check referred to in article 8, paragraph 2, point c), second hyphen,
– when needed, the reference to the harmonized standards,
– when needed, the national technical standards and specifications used,
– identification of the signatory authorized to hire the manufacturer or his representative established in the European Community.

Rotative axis safety limit switches
Technical data
Risk assessment & determination of control system categories

Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/392/EEC, every machine must comply with the relevant Directives and standards. Measures must be taken to keep the risk to persons below a tolerable extent.

In the first step, the project planner performs a risk evaluation to EN 1050 "Risk Assessment". This must take into consideration the machine's ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the result achieved. The risk, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment. After stipulating the extent on the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 "Safety-Related Components of Controls". This determined category defines the technical requirements applicable to the design of the safety equipment. There are five categories (B, 1, 2, 3 and 4) whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.



Rotative axis safety limit switches
Technical data
Control system categories as per EN 954-1

The main aim of all machine designers is to guarantee that the faults on safety-related control system parts or external disturbances cannot result in a dangerous situation or a dangerous event on the machine.

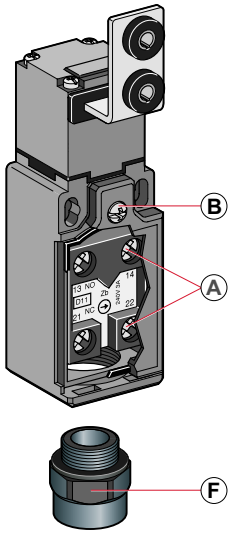
The summarising table below determines the category of the safety-related control system parts.

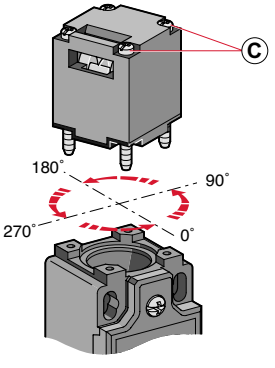
Categories	Summary of control system requirements	Control system behavior	Main principle for ensuring safety
B	The parts of the safety-related control system and / or its devices must be designed, manufactured, selected, mounted and combined according to proper procedures so as to withstand expected influences.	If a fault occurs, it may lead to possible loss of the safety function.	By selection of components conforming to relevant standards.
1	The requirements formulated in category B are combined with use of tried and tested safety components and principles.	– Occurrence of a fault may lead to possible loss of the safety function, but this is less probable than in category B.	By choice and use of safety components and principles.
2	The requirements formulated in category B and use of tried and tested safety principles apply. The safety function(s) must be tested regularly by the machine control system. Test frequency must be adapted to the machine and to its application.	– Occurrence of a fault may lead to possible loss of the safety function between the periodic test intervals. – Loss of the safety function is detected at each test.	By improvement of safety circuit structure.
3	The requirements formulated in category B and use of tried and tested safety principles apply. The control system must be designed so that: a) a single fault in the control does not lead to loss of the safety function and… (see paragraph b). b) if this is reasonably feasible, the single fault must be detected by appropriate technical means.	– When a single fault occurs, the safety function is always guaranteed. – Some faults will be detected, but not all. – Accumulation of undetected faults may lead to loss of the safety function.	By improvement of safety circuit structure.
4	The requirements formulated in category B and use of tried and tested safety principles must be applied. The control system must be designed so that: a) a single fault in the control does not lead to loss of the safety function and… (see paragraph b). b) if possible the single fault must be detected as soon as or before the next tripping of the safety function or... (see paragraph c). c) if this was not possible, an accumulation of faults must not lead to loss of the safety function.	– When faults occur, the safety function is always guaranteed. – The faults will be detected in time to prevent loss of the safety function.	By improvement of safety circuit structure.

Important: The safety categories apply to the entire control system and not to the individually considered safety components.

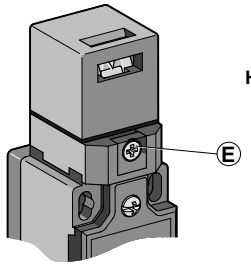
Rotative axis safety limit switches
Technical data

Tightening torques

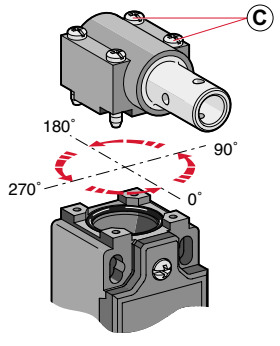




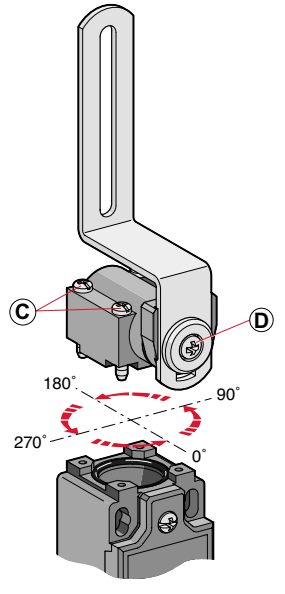
Head P80



Head P81



Heads P75 and P76

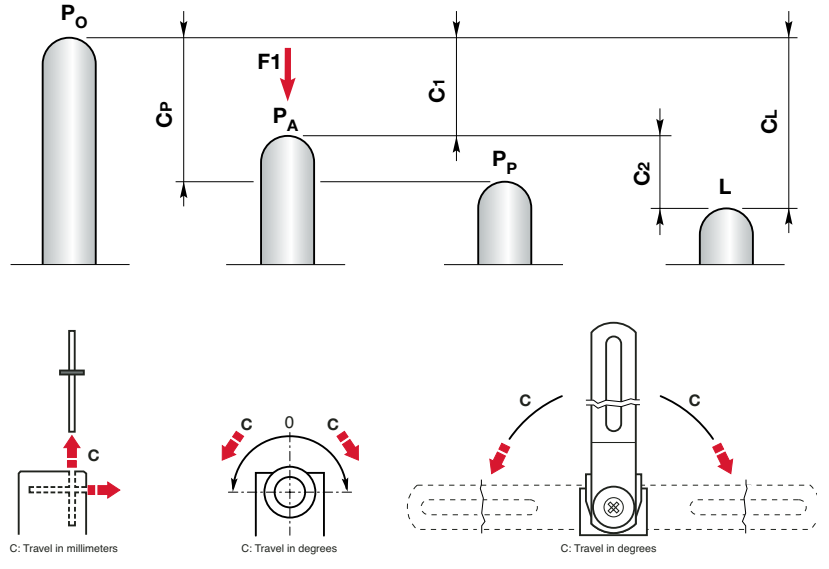


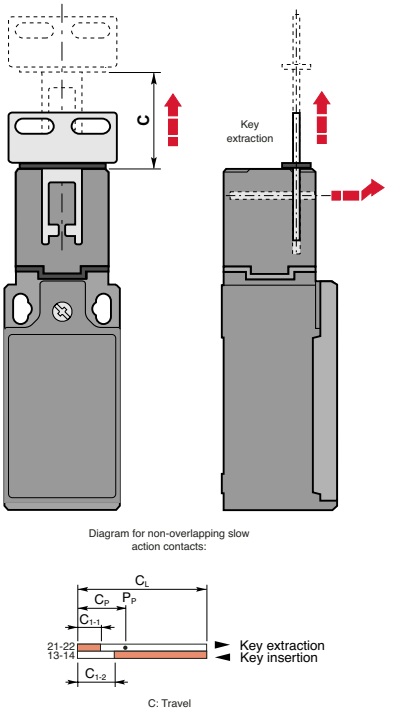
Head P77

	A		B		C		D		E		F	
	Contact block connecting terminals		Closing the cover		Assembling the operating head		Assembling the flush mounting right angle lever		Adjusting the pivoting head		Cable inlet by 1/2" NPT adaptor	
Screws	M3.5 ± pozidriv 2		ø3 ± pozidriv 1		ø3 ± pozidriv 1		M3.5 pozidriv 2		M3 Philips No. 1		–	
Tightening torque	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m
Limit switches												
LS35P80...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	–	–	17 / 150	18
LS35P81...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	–	–	–	–	0.3 / 2.63	0.5	17 / 150	18
LS35P75...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	–	–	17 / 150	18
LS35P76...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	–	–	17 / 150	18
LS35P77...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18

Connecting data of contact blocks		
Connecting terminals		M3.5 (+,–) pozidriv 2 screw with cable clamp
Connecting capacity	1 or 2 x mm^2 / AWG	0.5 mm^2 / AWG 20 to 2.5 mm^2 / AWG 14
Terminal marking		According to EN 50013

Rotative axis safety limit switches
Technical data





P_O 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.

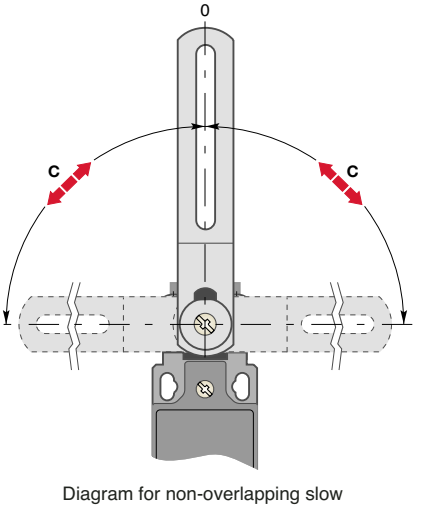
C_1 Pre-travel (average travel):
distance between the free position P_O and the operating position P_A.

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 (N.C.).

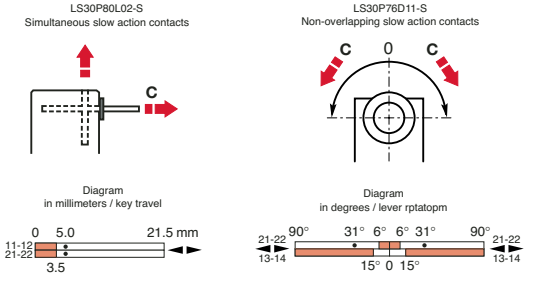
C_2 Over-travel (average travel):
distance between the operating position P_A and the max. travel position L.

C_L Max. travel (maximum travel):
distance between the free position P_O and the max. travel position L.

Note: C_{1-1} = pre-travel of contact 21-22,
C_{1-2} = pre-travel of contact 13-14.



Examples:



Contacts position

21-22 Contact closed
21-22 Contact open

Rotative axis safety limit switches
Technical data
Terminology

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

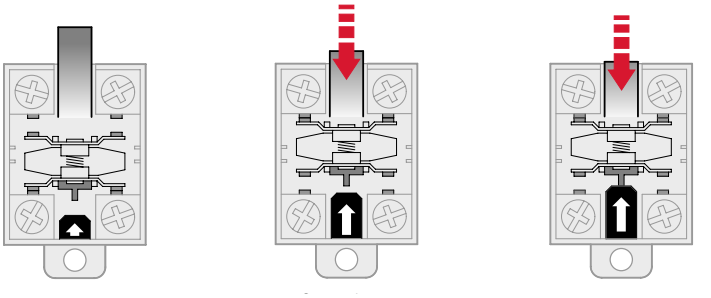
A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between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

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: .

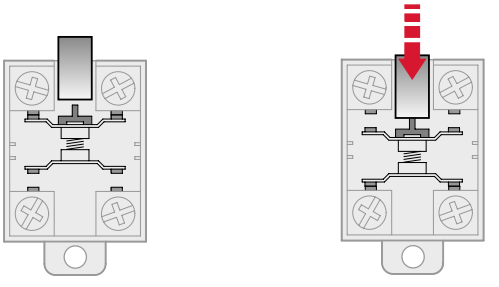
Snap Action

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.

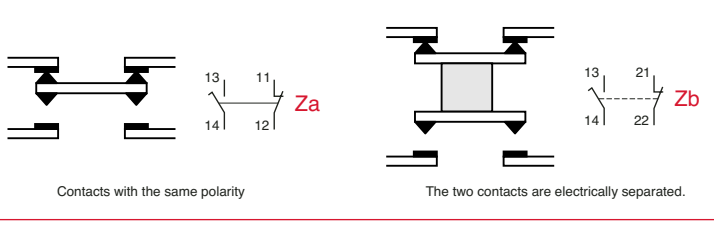


Slow Action

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.



Contact shape according to IEC 60947-5-1.
Change-over contact elements with 4 terminals must be indelibly marked Za or Zb.
See figure opposite for contact representation.



Utilization category

AC-15: switching of electromagnetic loads of electromagnets using an alternating current (>72 VA).
DC-13: switching of electromagnets using a direct courant.

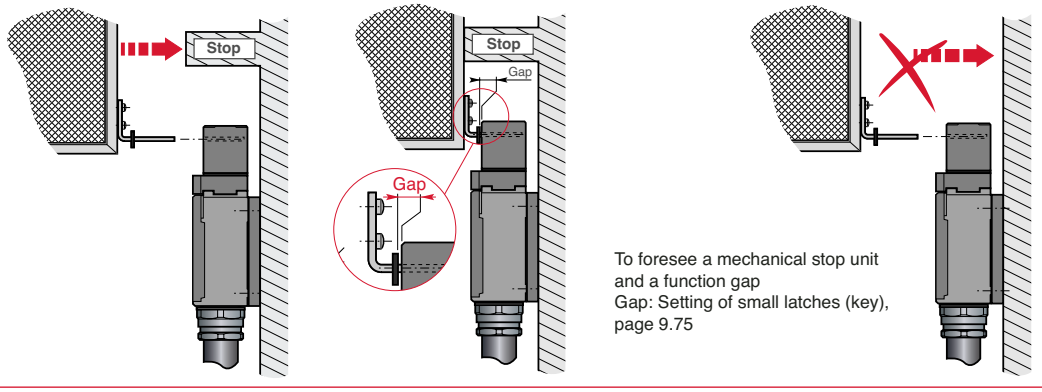
Minimum actuation force / torque

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

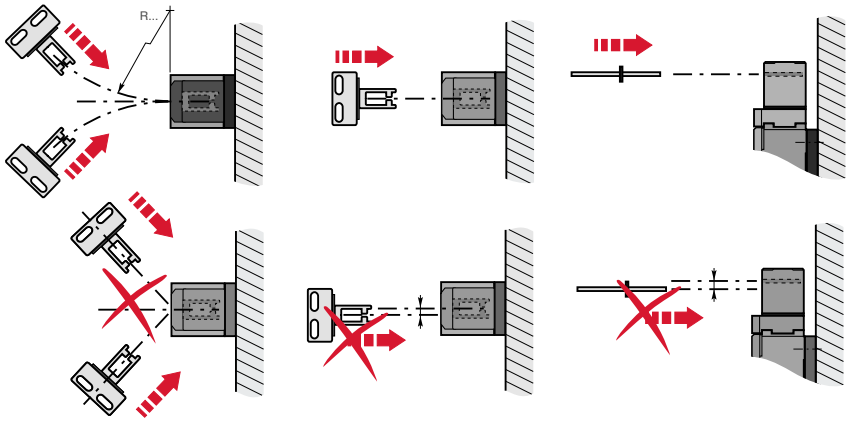
The minimum amount of force/torque that is to be applied to the switch actuator to ensure positive opening operation of the N.C. contact.

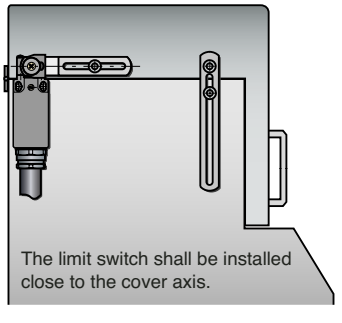
Rotative axis safety limit switches
Technical data
Utilization cautions



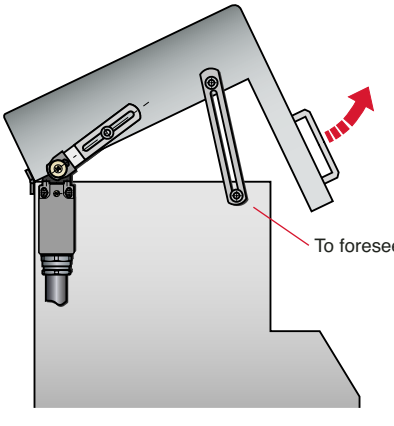
To foresee a mechanical stop unit and a function gap
Gap: Setting of small latches (key), page 9.75

The small latch (key) shall be presented in the axis of the control head.



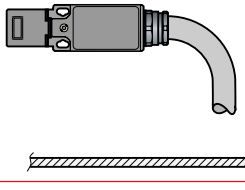


The limit switch shall be installed close to the cover axis.

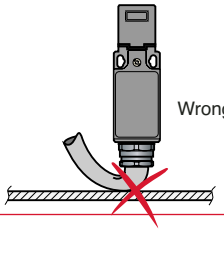


To foresee a stop gear

Curve of connecting cable

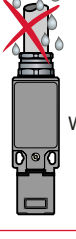


Correct



Wrong

Cable gland orientation



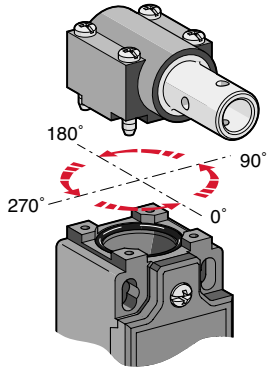
Wrong

Rotative axis safety limit switches
Technical data

Implementation

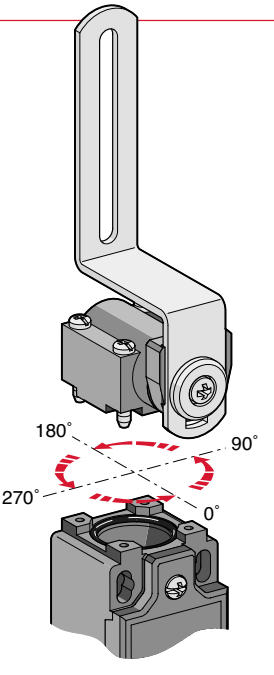
Limit switches with rotative axis
LS35P75...-S, LS35P76...-S

- Head adjustment every 90°

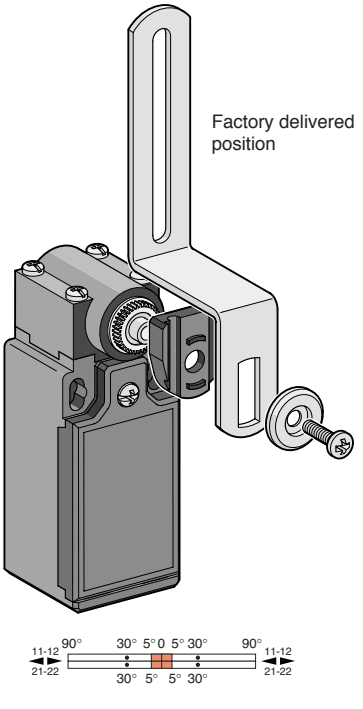


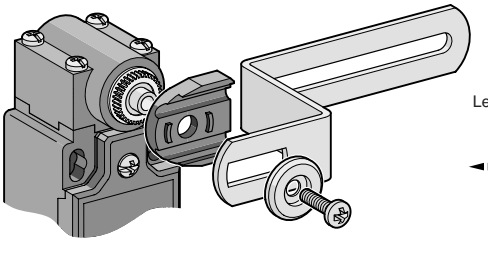
Limit switches with flush mounting right angle lever
LS35P77...-S

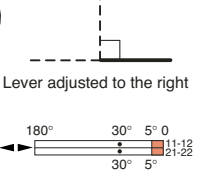
- Head adjustment every 90°



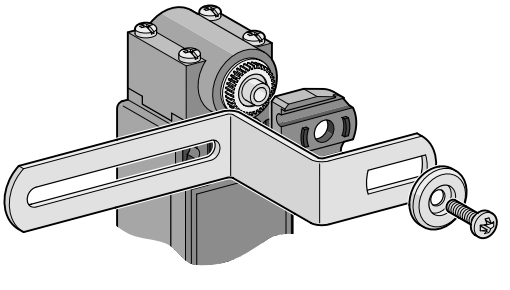
Each lever adjustment has a specific operation diagram.
(In these exxamples, the diagrams correspond to an L02 contact block.)

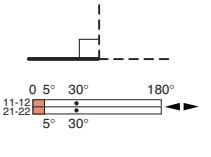






Lever adjustment by the user





Latch & manual reset
Safety limit switches

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.
Made of fibre-glass reinforced UL-V0 thermoplastic material, they offer double insulation and a degree of protection IP65.
Limit switches with latch and manual reset are equipped with 1 N.C. + 1 N.O. or 2 N.C. 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.

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 (Zb shape).
- 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.
Limit switches with latch and manual reset comply with the requirements of standard EN 81-1: safety rules for the construction and installations of electric lifts. In this application they detect or monitor: cabin overtravel, cabin speed by means of a speed limiting device, energisation of the parachute block on detection of excessive speed with respect to the set-point value, etc.

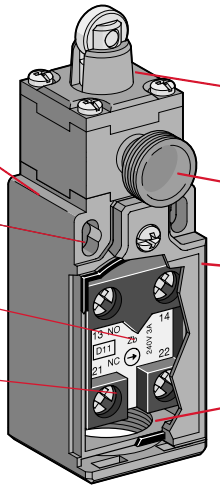
They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

Casing
- 30 mm wide with standardized dimensions corresponding to EN 50047

Casing fixing
- 2 M4 screws in the top part

Blocks of 2 contacts
- Contact configuration: 1 N.O. + 1 N.C. or 2 N.C.
- Positive opening operation ⊖
- Snap or dependent action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals
- M3.5 screw with (+,-) posidriv 2 head
- Screw heads with captive cable clamps
- Marking conform to IEC 60947-1, IEC 60947-5-1, EN 50005 and EN 50013 standards



4 operating head options:
- Plain plunger
- Roller plunger
- Roller lever on plunger
- Rotative roller lever

Assembly by 4 x ø 3 screws with (+,-) pozidriv 1 head

Blue manual reset button

Cover
- Closure by 1x ø 3 screw with (+,-) pozidriv 1 head

Gasket made in one part to prevent tightness breaks

Electrical connection in various options:
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 11 cable gland for LS31P
- 1 x 1/2" NPT adaptor delivered not mounted for LS35P

Catalog number explanation

Example: **LS 35 P 13 D11 R**

Limit Switch ..... **LS**

Casing width: 30 mm **3**

Cable inlet:
1 cable inlet for Pg 13.5 cable gland **0**
1 cable inlet for Pg 11 cable gland **1**
1 x 1/2" NPT (adaptor) cable inlet **5**

Plastic casing ..... **P**

Operating heads:
Galvanised steel plain plunger **11**
Galvanised steel roller plunger **12**
Plastic roller plunger **13**
Plastic roller lever on plunger (hori. act.) **31**
Plastic roller lever on plunger (ver. act.) **32**
Rotative lever with plastic roller **41**

Contact types:
11 ..... **1** N.O. + **1** N.C. contacts
02 ..... **2** N.C. contacts

Snap action:
B .....Zb Snap

Dependent (slow) action:
L .....Zb Slow / Simultaneous
D .....Zb Non-overlapping late make
C .....Zb Overlapping early make

R .....**Reset Device**

Latch & manual reset
30mm

Movement to be detected

	On End	On End or 30° Cam Translation	
			

Casing

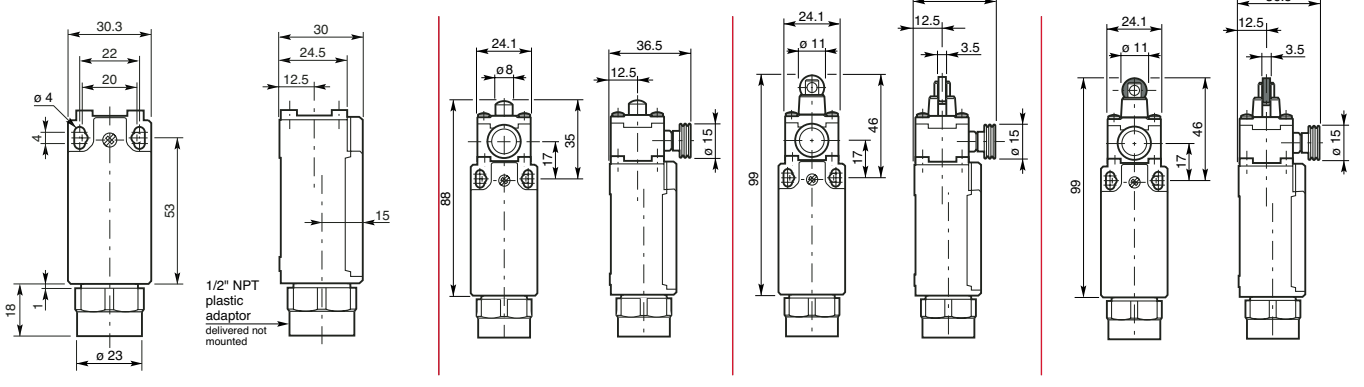
- Plastic
- 30 mm width
- Degree of protection IP65

Actuator

			Galvanized steel plain plunger	Galvanized steel roller plunger	Plastic roller plunger
"N.C." contact with positive opening operation			⊖	⊖	⊖
Maximum actuation speed		m/s	0.5	0.3	0.3
Min. force: – actuation		N	9	12	12
– positive opening operation		N	44	41	41
Non-overlapping slow action contacts	Catalog number		LS35P11D11-R	LS35P12D11-R	LS35P13D11-R
	List price		**$ 39**	**$ 43**	**$ 41**
13 21 Zb 14 22	Operation diagram		0 1.6 3.2 5.9 mm; 21-22 13-14; 2.5 4.4	0 2.7 5.4 9.6 mm; 21-22 13-14; 4.3 7.5	0 2.7 5.4 9.6 mm; 21-22 13-14; 4.3 7.5
Simultaneous slow action contacts	Catalog number		LS35P11L02-R	LS35P12L02-R	LS35P13L02-R
	List price		**39**	**43**	**41**
11 21 Zb 12 22	Operation diagram		0 1.4 3.0 5.9 mm; 11-12 21-22; 1.4 3.0 4.4	0 2.4 5.1 9.6 mm; 11-12 21-22; 2.4 5.1 7.5	0 2.4 5.1 9.6 mm; 11-12 21-22; 2.4 5.1 7.5
Snap action contacts	Catalog number		LS35P11B02-R	LS35P12B02-R	LS35P13B02-R
	List price		**39**	**43**	**41**
11 21 Zb 12 22	Operation diagram		0 2.4 4.0 5.9 mm; 11-12 21-22; 1.4 4.4	0 4.2 6.9 9.6 mm; 11-12 21-22; 2.4 7.5	0 4.2 6.9 9.6 mm; 11-12 21-22; 2.4 7.5
Weight (packing per unit)		kg	0.097	0.102	0.097

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)



Latch & manual reset
30mm

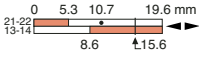
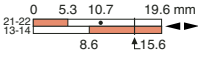
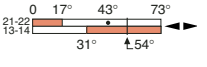
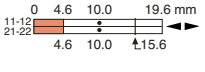
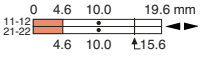
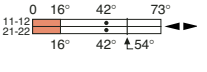
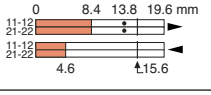
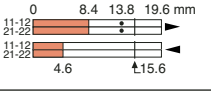
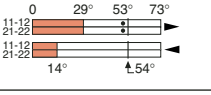
Movement to be detected

	30° Unidirectional Cam Translation Movement		30° Cam Translation
			

Casing

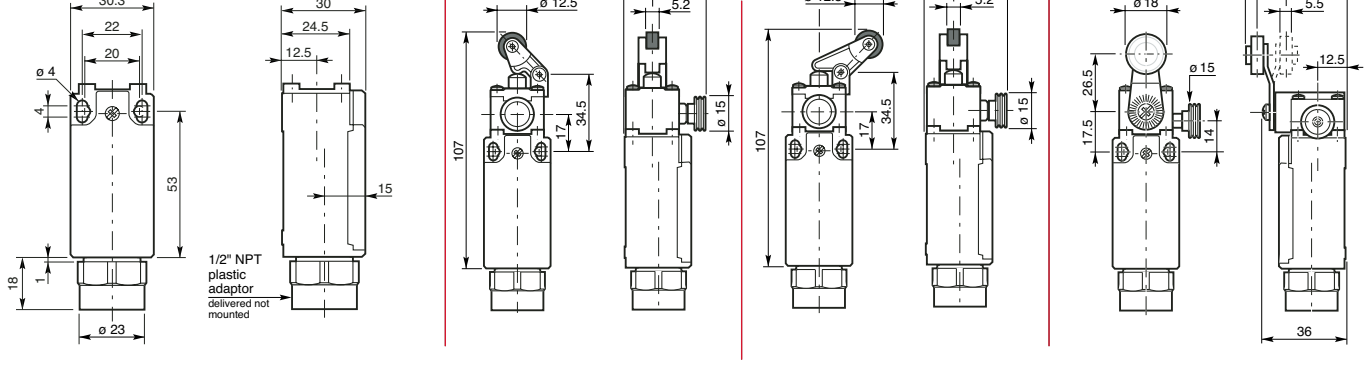
- Plastic
- 30 mm width
- Degree of protection IP65

Actuator

		Plastic roller lever on galvanized steel plunger	Plastic roller lever on galvanized steel plunger	Rotary lever with plastic roller
"N.C." contact with positive opening operation		⊖	⊖	⊖
Maximum actuation speed	m/s	1	1	1.5
Min. force / torque:	– actuation	7 N	3 N	0.10 N.m
	– positive opening operation	24 N	24 N	0.32 N.m
Non-overlapping slow action contacts	Catalog number	LS35P31D11-R	LS35P32D11-R	LS35P41D11-R
	List price	**$ 43**	**$ 43**	**$ 43**
13 21 Zb 14 22	Operation diagram			
Simultaneous slow action contacts	Catalog number	LS35P31L02-R	LS35P32L02-R	LS35P41L02-R
	List price	**43**	**43**	**43**
11 21 Zb 12 22	Operation diagram			
Snap action contacts	Catalog number	LS35P31B02-R	LS35P32B02-R	LS35P41B02-R
	List price	**43**	**43**	**43**
11 21 Zb 12 22	Operation diagram			
Weight with 1/2" NPT adaptor (packing per unit)	kg	0.102	0.102	0.102

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)



Latch & manual reset
Technical data

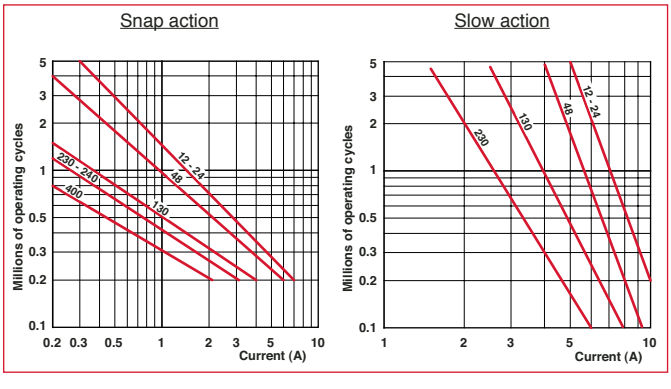
General Data

Standards		IEC 60947-1, IEC 60947-5-1, EN 60947-1, EN 60947-5-1, UL 508, CSA C22-2 No.14
Certifications - Approvals		UL and CSA
Air temperature near the device		
– during operation	°C	-25 ... +70
– for storage	°C	-30 ... +80
Climatic withstand		According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions		All positions are authorised
Shock withstand (according to IEC 68-2-27 and EN 60068-2-27)	g	50 g (1/2 sinusoidal shock for 11 ms) no change in contact position
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60068-2-6)	g	25 g (10 ... 500 Hz) no change in position of contacts > 100 μs
Protection against electrical shocks (acc. to IEC 536)		Class II
Degree of protection (according to IEC 529 et EN 60529)		IP65
Consistency		0.1 mm upon closing points
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

Electrical Data

Rated insulation voltage U_i				
– according to IEC 60947-1 and EN 60947-1			V	690 (degree of pollution 3)
– according to UL 508, CSA C22-2 No.14				A600, Q600
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)			kV	6
Conventional free air thermal current I_{th} (according to IEC 60947-5-1 and EN 60947-5-1) (Ø ≤ 40 °C)			A	10
Short-circuit protection gG type fuses			A	10
Rated operational current				
I_e / AC-15	– acc. to IEC 60947-5-1	24 V - 50/60 Hz	A	10
		130 V - 50/60 Hz	A	5.5
		230 V - 50/60 Hz	A	3.1
		240 V - 50/60 Hz	A	3
		400 V - 50/60 Hz	A	1.8
	– according to UL 508, CSA C22 No.14			A600
I_e / DC-13	– according to IEC 60947-5-1	24 V - d.c.	A	2.8
		110 V - d.c.	A	0.6
		250 V - d.c.	A	0.27
	– according to UL 508, CSA C22 No.14	Q600		
Positivity				Contacts with positive opening operation as per IEC 60947-5-1 chapter 3 and EN 60947-5-1
Resistance between contacts			mΩ	25
Mechanical durability			Millions of operations	> 1 million of operating cycles
Max. switching frequency			Cycles/h	600
Electrical durability (according to IEC 60947-5-1 appendice C)				Utilization categories AC-15 and DC-13 (see curves and values below)
– Max. switching frequency			Cycles/h	3600
– Load factor				0.5

Electrical durability for AC-15 utilization category

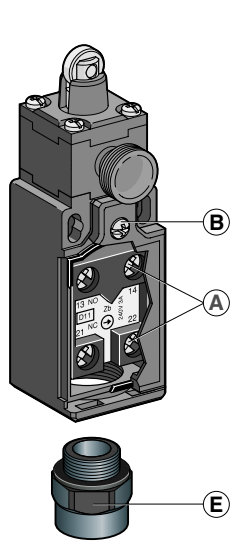


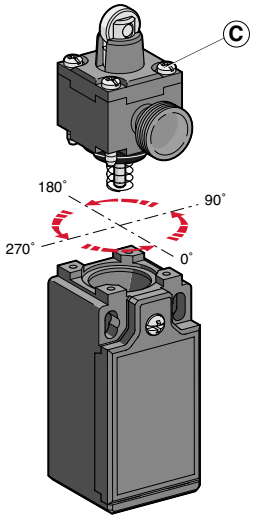
Electrical durability for DC-13 utilization category

		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

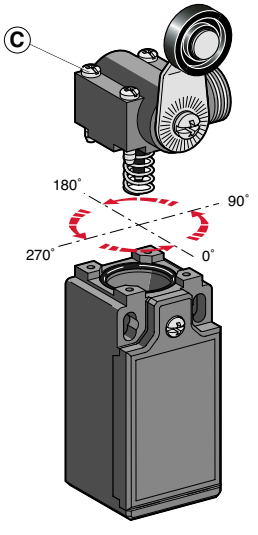
Latch & manual reset
Technical data

Tightening Torques

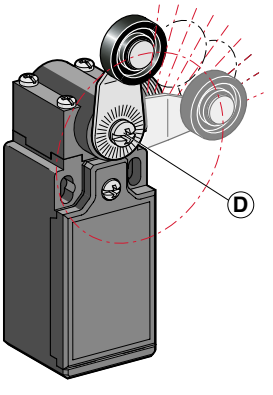




Heads P11, P12, P13, P31 and P32



Head P41



Roller lever

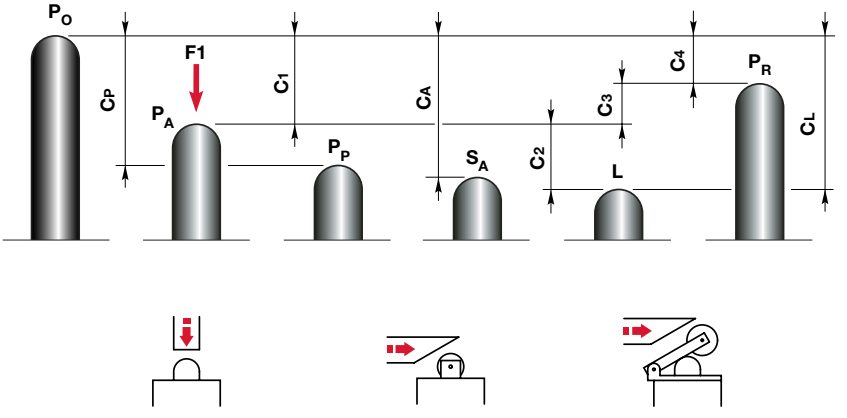
	A		B		C		D		E	
	Contact block connecting terminals		Closing the cover		Assembling the operating head		Assembling or adjusting the lever with plastic roller		Cable inlet by 1/2" NPT adaptor	
Screws	M3.5 ± pozidriv 2		ø3 ± pozidriv 1		ø3 ± pozidriv 1		ø4 ± Philips No. 2		–	
Tightening torque	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m
Limit switches										
LS35P11...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P12...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P13...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P31...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P32...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P41...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	0.5 / 4.3	0.8	17 / 150	18

Connecting data of contact blocks

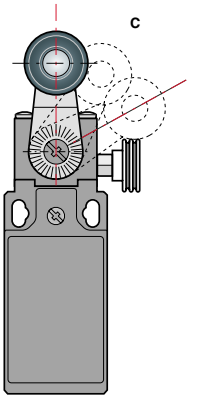
Connecting terminals		M3.5 (+,–) pozidriv 2 screw with cable clamp
Connecting capacity	1 or 2 x mm^2 / AWG	0.5 mm^2 / AWG 20 to 2.5 mm^2 / AWG 14
Terminal marking		According to EN 50013

Latch & manual reset
Technical data

Travel and operation diagrams



C: Travel in millimeters



C: Travel in degrees

P_O 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 (N.C.) contact(s) 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 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 (average travel):
distance between the free position P_O 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 (N.C.).

C_A Latching travel (average travel):
distance between the free position P_O and the latching point S_A.

C_2 Over-travel (average travel):
distance between the operating position P_A and the max. travel position L.

C_L Max. travel (maximum travel):
distance between the free position P_O and the max. travel position L.

C_3 Differential travel (C_1-C_4) (average travel):
travel difference of the switch actuator between the operating position P_A and the release position P_R.

C_4 Release travel (average travel):
distance between the release position P_R and the free position P_O.

Diagram for snap action contacts:

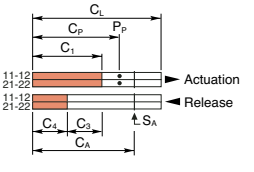
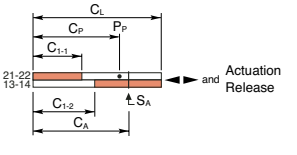
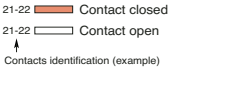


Diagram for non-overlapping slow action contacts:



Contacts position



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.

Examples:

LS30P13D11-R
non-overlapping slow action contacts

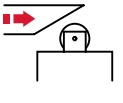
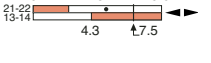


Diagram in millimetres / cam travel



LS30P41L02-R
simultaneous slow action contacts

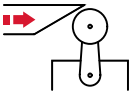
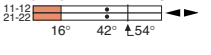


Diagram in degrees / lever rotation



LS30P11B02-R
snap action contacts

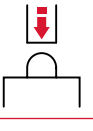
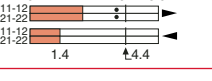


Diagram in millimetres / plunger travel



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

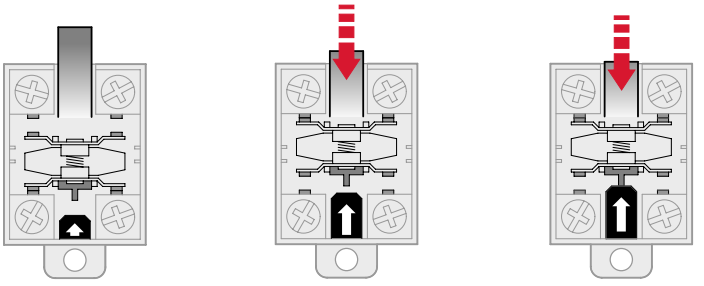
A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between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

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: .

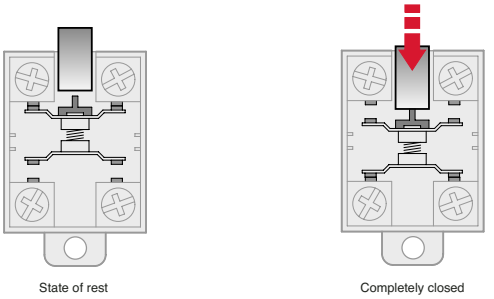
Snap Action

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.

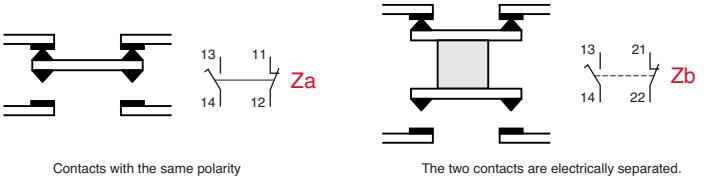


Slow Action

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.



Contact shape according to IEC 60947-5-1.
Change-over contact elements with 4 terminals must be indelibly marked Za or Zb.
See figure opposite for contact representation.



Utilization category

AC-15: switching of electromagnetic loads of electromagnets using an alternating current (>72 VA).
DC-13: switching of electromagnets using a direct courant.

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

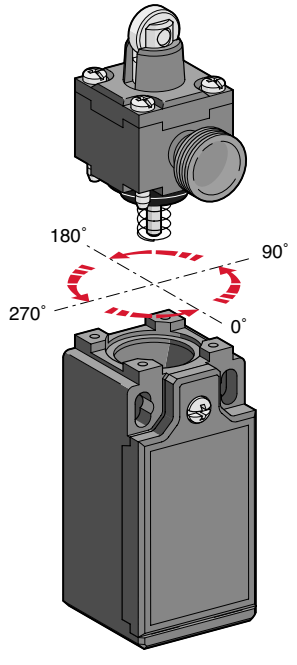
The minimum amount of force/torque that is to be applied to the switch actuator to ensure positive opening operation of the N.C. contact.

Latch & manual reset
Technical data
Implementation

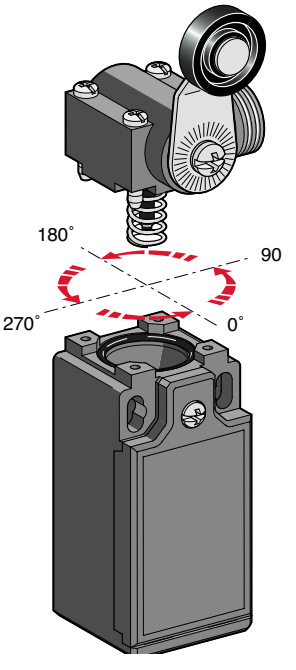
Implementation

Limit switches with latch and manual reset
LS35P...-R.

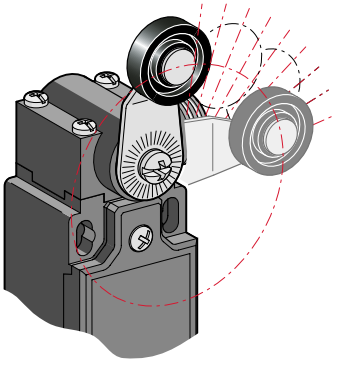
- Adjustment of the heads reference P11, P12, P13, P31 and P32.



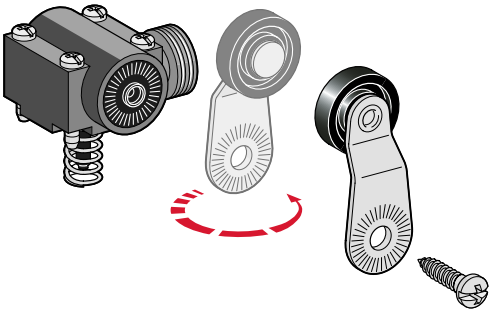
- Adjustment of the head reference P41.



- Angular adjustment 10° in 10° of the lever on head P41.

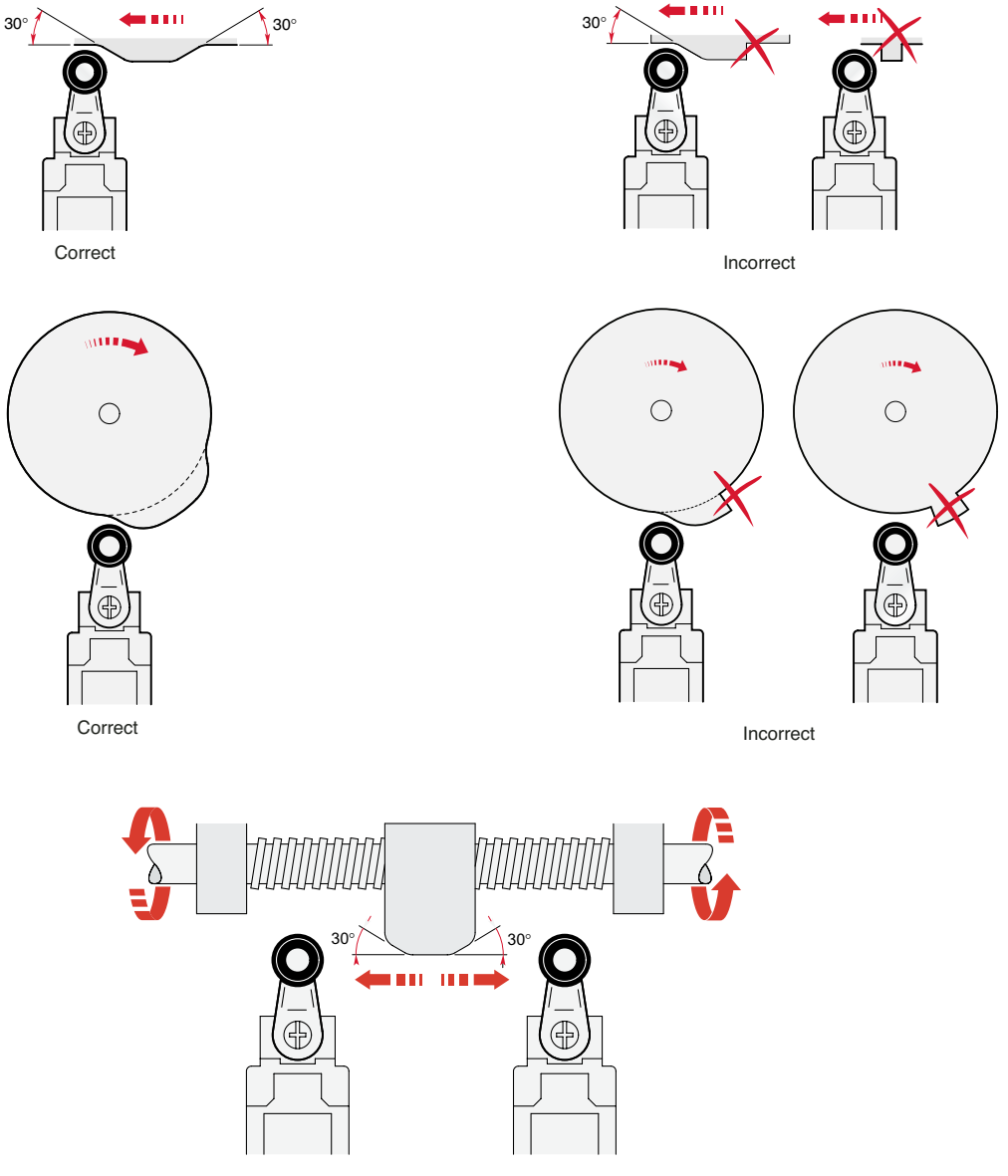


- Lever round turning on head P41.



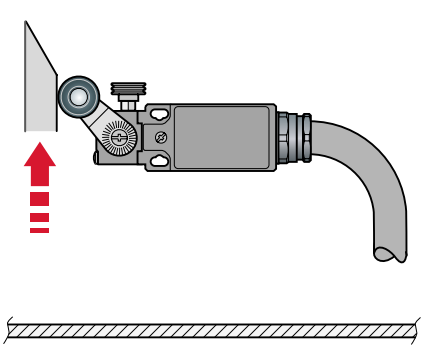
Plain plunger

Roller plunger or roller lever

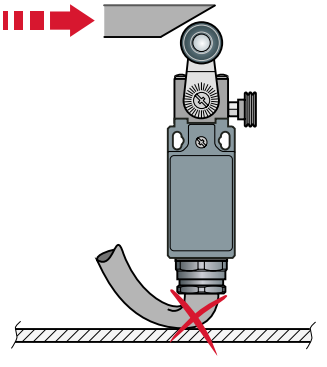


Latch & manual reset
Technical data
Utilization precautions

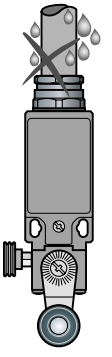
Curve of connecting cable / cable gland orientation



Correct



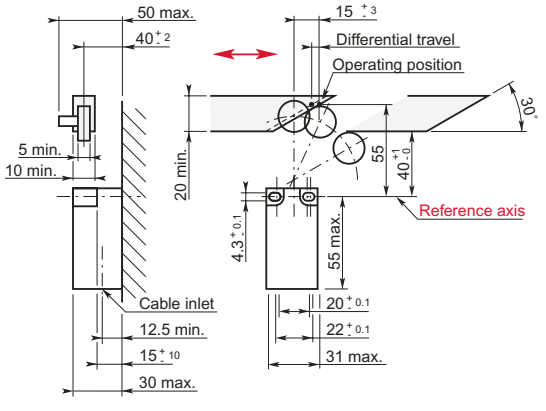
Incorrect



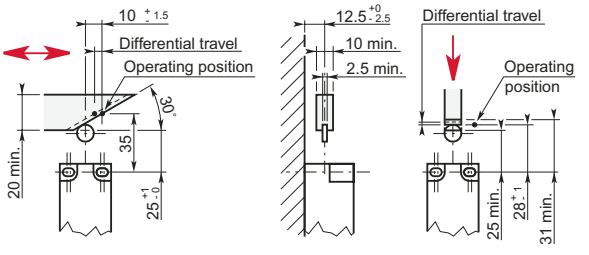
Latch & manual reset
Technical data
EN 50047 standard

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards. The present standard defines dimensions and mechanical data for limit switches (30mm x 55mm).

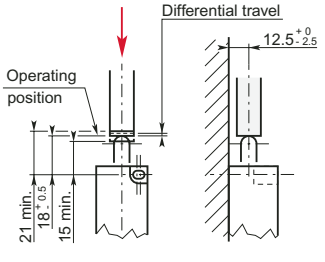
A Shape
Roller lever operating heads



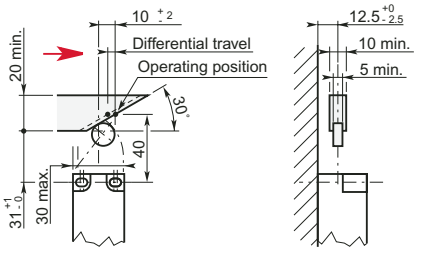
C Shape
Roller plunger operating heads



B Shape
Rounded plunger operating heads



E Shape
Roller lever operating heads

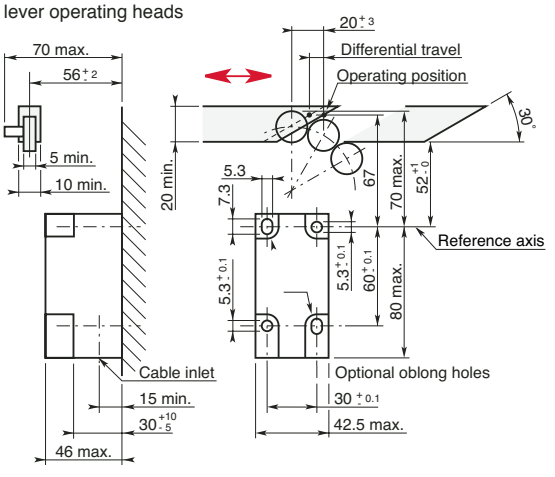


9

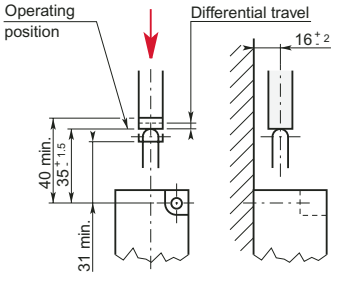
Latch & manual reset
Technical data
EN 50041 standard

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 countries, publishes EN standards. The present standard defines dimensions and mechanical data for limit switches (42.5 x 80 mm).

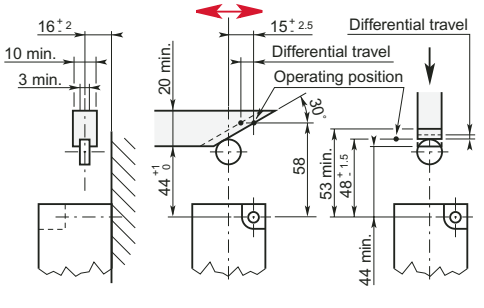
A Shape
Roller lever operating heads



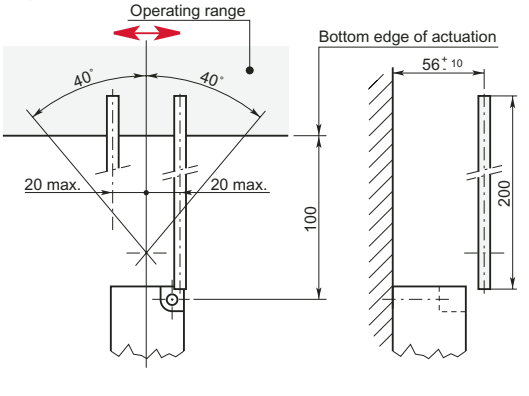
B Shape
Rounded plunger operating heads



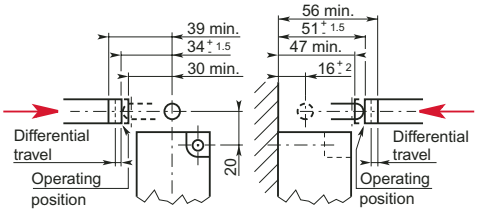
C Shape
Roller plunger operating heads



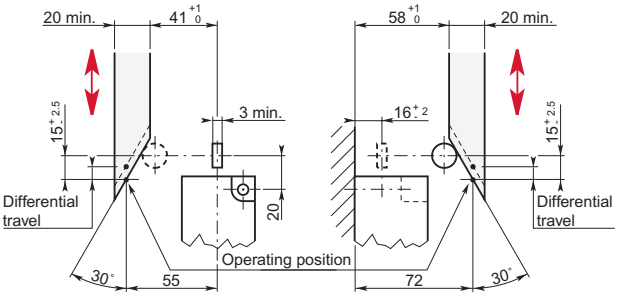
D Shape
Rod operating heads



F Shape
Rounded lateral plunger operating heads



G Shape
Lateral roller plunger operating heads – Lateral actuation



Lateral roller plunger operating heads – Front actuation