

## Heavy duty limit switches with snap-action contacts and positive break according to BS/EN60947-5-1.

- Bifurcated contacts for low resistance and high reliability – suitable for switching low-level electronic currents
- Double-break contacts with electrically separate NO and NC circuits in conformity with VDE 0660 part 206
- 10A 500VAC/600VDC rated
- Lever types can be user-set to switch by clockwise movement only, anti-clockwise only or both
- Turret head position rotatable in 90° increments
- Centre-position indicator arrow – lever actuators
- Wide range of actuators
- Single and triple cable entry models
- Removable contact block for ease of wiring
- Metal or plastic housing options
- IP66 according to BS EN60947-1
- FD and FP dimensions in accordance with EN50041
- Approvals: UL, CSA



## Options and ordering codes

	<b>FD</b>	<b>5</b>	<b>01</b>	
Heavy duty metal housing	FD			-
Heavy duty plastic housing	FP			
Triple entry metal housing	FL			
Snap-action contacts, 1NO + 1NC		5		
Slow-action, break before make 1NO + 1NC		6		
Slow-action, make before break 1NO + 1NC		7		
Slow-action contacts, 2NC		9		
Slow-action contacts, 2NO		10		
Snap-action contacts, 2NC		11		
Slow-action contacts, break before make 2NC + 1NO		20		
Slow-action contacts, break before make 3NC		21		
Slow-action contacts, break before make 1NC + 2NO		22		
Snap-action contacts, 2NO + 2NC		2		

38	Standard actuators – options overleaf
385	Lift-style turret with 75° total travel
385	Lift-style turret with 90° total travel

Specify lever type for lift-style switch:

L313	Fixed position roller
L353	Single adjustment roller
L354	Dual adjustment roller

**Please note: Positive break applies to the NC contacts of types 5, 6, 7, 9, 11, 20, 21 and 22 only.**

## Specifications

Rated thermal current Ith	10A
Rated working voltage	500VAC/600VDC
Maximum operating frequency	6000/hour
Mechanical life	>20 million operations
Contact form	1NO + 1NC
Initial contact resistance	<25 mOhms
Contact gap	>2.5mm (2 x 1.25mm conforming to VDE 0660 part 206)
Contact material	silver
Dielectric strength	2000VAC, 50/60Hz for 1 minute between open contacts 2000VAC, 50/60Hz for 1 minute between current-carrying parts and ground
Protection rating	IP66
Ambient operating temperature	-25 to +80 deg. C
Ambient humidity	95% R.H.
Maximum wire size	2 x 1.5mm <sup>2</sup> flexible, 2 x 2.5mm <sup>2</sup> solid
Housing material	FD/FL: die-cast metal alloy, FP: self-extinguishing, glass-reinforced, thermoplastic resin
Conduit entry	PG 13.5

## Contact ratings

BS/EN 60947-5-1		
AC15 – Control of AC electromagnetic loads >72VA sealed – replaces AC11	230VAC 400VAC 500VAC	6A 4A 1A
DC13 – Control of DC electromagnetic loads where the time taken to reach 95% of the rated current is equal to 6 times the power of the load (where P<50W) – replaces DC11	24VDC 125VDC 250VDC	6A 1.1A 0.4A

## Terminal connections

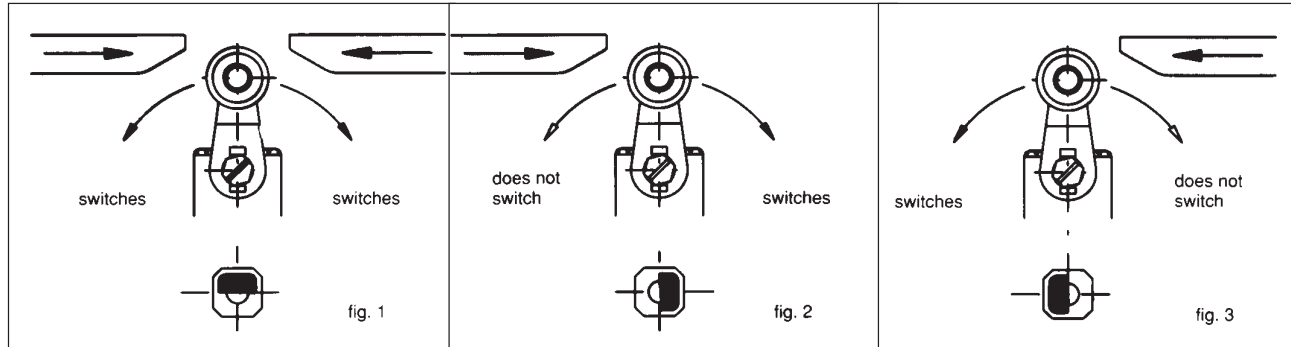
Terminal screws: M3.5 with rising cable clamps.  
 Standard contacts (type 5) NO: 13-14, NC: 21-22  
 Note: The positive break of the type 5 contact block applies to the NC contacts only. Connections to safety circuits should NOT be made using the NO contacts.  
 To ensure positive breaking of the contacts, exceed the pre-travel by 1.5mm or 25° according to the model.  
 Maximum screw tightening torque 0.8Nm (8Kg cm)

## Programmable head – lever operation models

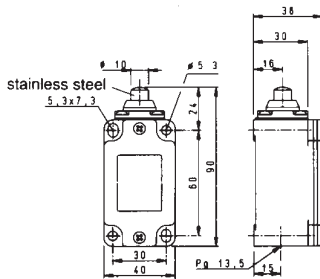
All limit switches with lever operation in the FD/FP/FL ranges can be user-set to switch by clockwise rotation only, anti-clockwise only or both. To change the operation, which is factory set to switch in both directions, the four screws securing the turret head should be loosened, the head removed and the internal piston rotated through 90°. The head should then be replaced.

The models to which this applies are: 531; 532; 533; 535; 536; 538; 551; 552; 553.

Figure 1 shows the piston position for switching in both directions, figure 2 for clockwise only and figure 3 for anti-clockwise only.

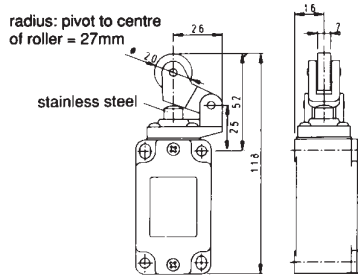


## Standard actuator options – FD and FP series



### Actuator type 01 Piston plunger

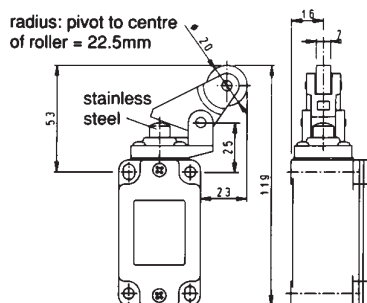
Operating force min.	OF	820g
Pre-travel	PT	2mm
Over-travel	OT	4mm
Movement differential	MD	1mm
Operating point	OP	22mm
Operating speed max.	OS	0.5m/s



### Actuator type 02 One-way roller - top actuated

Operating force min.	OF	615g
Pre-travel	PT	2.9mm
Over-travel	OT	5.6mm
Movement differential	MD	1.6mm
Operating point	OP	49.1mm
Operating speed max.	OS	0.5m/s using a 30° cam

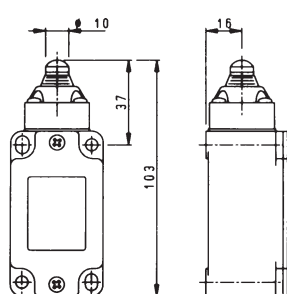
Note: ø20mm plastic roller as standard,  
ø20mm metal roller actuator part no.: 021



### Actuator type 05 One-way roller-side actuated

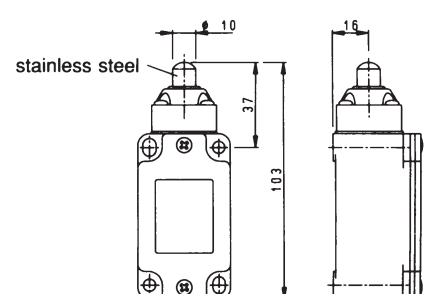
Operating force min.	OF	615g
Pre-travel	PT	2.9mm
Over-travel	OT	5.6mm
Movement differential	MD	1.6mm
Operating point	OP	-
Operating speed max.	OS	0.5m/s using a 30° cam

Note: ø20mm plastic roller as standard,  
ø20mm metal roller actuator part no.: 051



### Actuator type 10 Sealed piston plunger

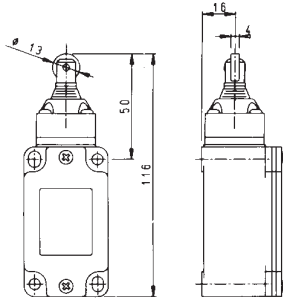
Operating force min.	OF	1125g
Pre-travel	PT	2mm
Over-travel	OT	4mm
Movement differential	MD	1mm
Operating point	OP	35mm
Operating speed max.	OS	0.5m/s



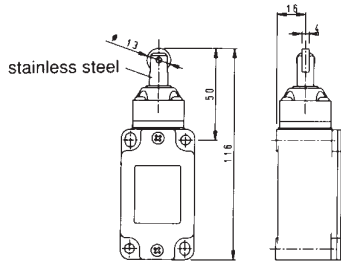
### Actuator type 11 Long piston plunger

Operating force min.	OF	820g
Pre-travel	PT	2mm
Over-travel	OT	4mm
Movement differential	MD	1mm
Operating point	OP	35mm
Operating speed max.	OS	0.5m/s

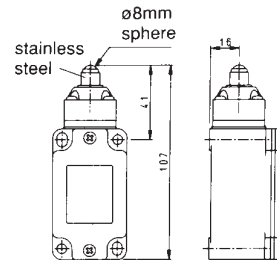
Standard actuator options – FD and FP series



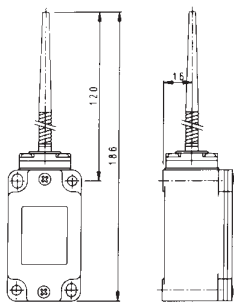
**Actuator type 15**  
**Sealed roller piston plunger**  
 OF 1125g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 48mm  
 OS 0.5m/s using a 30° cam  
 Note: ø13mm metal roller only



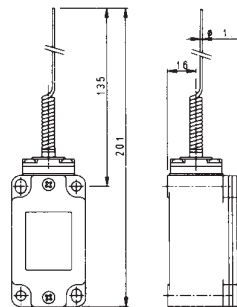
**Actuator type 16**  
**Roller piston plunger**  
 OF 820g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 48mm  
 OS 0.5m/s using a 30° cam  
 Note: ø13mm metal roller only



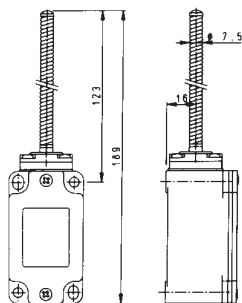
**Actuator type 18**  
**Rolling ball piston plunger**  
 OF 820g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 39mm  
 OS 0.5m/s



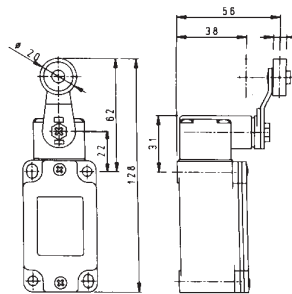
**Actuator type 20**  
**Sealed coil spring with flexible rod**  
 OF 125g at 2/3 the length of the actuator  
 PT 14°  
 OT -  
 MD 7°  
 OP -  
 OS 1m/s  
 Notes: Not suitable for safety circuits  
 Not suitable for use with contact blocks 20, 21 or 22



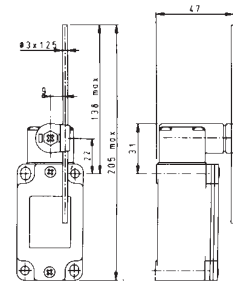
**Actuator type 21**  
**Sealed coil spring with cat's whisker**  
 OF 92g at 2/3 the length of the actuator  
 PT 14°  
 OT -  
 MD 7°  
 OP -  
 OS 1m/s  
 Notes: Not suitable for safety circuits  
 Not suitable for use with contact blocks 20, 21 or 22



**Actuator type 25**  
**Sealed coil spring**  
 OF 195g at 2/3 the length of the actuator  
 PT 14°  
 OT -  
 MD 7°  
 OP -  
 OS 1m/s  
 Notes: Not suitable for safety circuits  
 Not suitable for use with contact blocks 20, 21 or 22

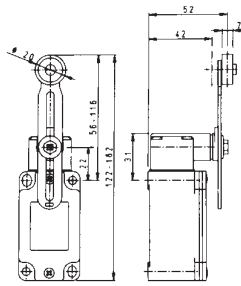


**Actuator type 31**  
**Roller-lever with small offset**  
 OF 1530gcm  
 PT 30°  
 OT 45°  
 MD 14°  
 OP -  
 OS 1.5m/s using a 30° cam  
 Notes: 1. ø20mm plastic roller as standard, ø20mm metal roller actuator part no.:311; ø35mm plastic roller actuator part no.:312; ø50mm rubber roller actuator part no.:313. 2. Lever position adjustable over 360° in 10° increments



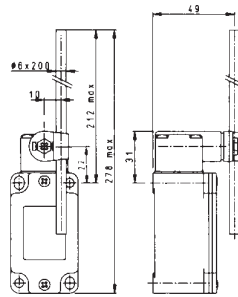
**Actuator type 32**  
**Adjustable round steel rod lever**  
**Actuator type 33**  
**Adjustable square steel rod lever (rod 3x3x125)**  
 OF 1530gcm  
 PT 30°  
 OT 45°  
 MD 14°  
 OP -  
 OS 1.5m/s  
 Note: Lever position adjustable over 360° in 10° increments

## Standard actuator options – FD and FP series



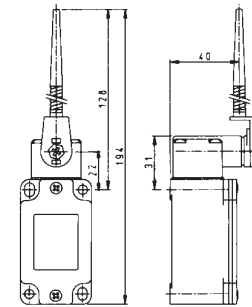
**Actuator type 35**  
**Adjustable roller lever**

OF 1530gcm  
PT 30°  
OT 45°  
MD 14°  
OP –  
OS 1.5m/s using a 30° cam  
Notes: 1.  $\varnothing 20$ mm plastic roller as standard,  $\varnothing 20$ mm metal roller actuator part no.:351;  $\varnothing 35$ mm plastic roller actuator part no.:352;  $\varnothing 50$ mm rubber roller actuator part no.:353. 2. Lever position adjustable over 360° in 10° increments



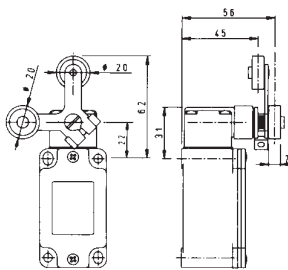
**Actuator type 36**  
**Adjustable glass-fibre rod lever**

OF 1530gcm  
PT 30°  
OT 45°  
MD 14°  
OP –  
OS 1.5m/s  
Notes: 1. Not suitable for safety circuits. 2. Lever position adjustable over 360° in 10° increments

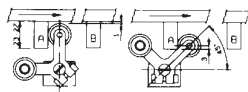


**Actuator type 38+L34**  
**Coiled spring lever with flexible rod**

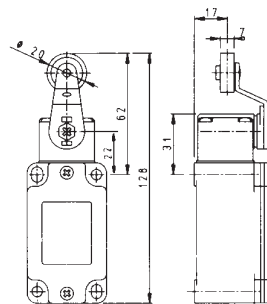
OF 1530gcm  
PT 30°  
OT 45°  
MD 14°  
OP –  
OS 1.5m/s  
Notes: 1. Not suitable for safety circuits. 2. Lever position adjustable over 360° in 10° increments



**Actuator type 40**  
**Dual roller lever with two stable free positions**

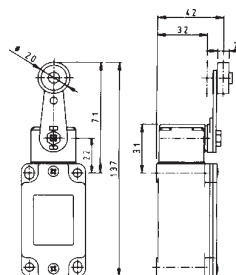


Specify lever type:  
Double track (shown above) L42  
Single track (not shown) L41  
Steel rod lever L43



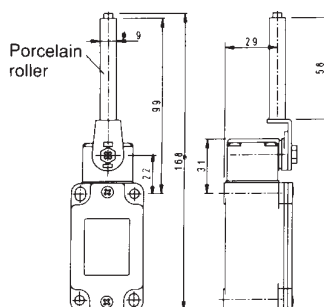
**Actuator type 51**  
**Roller-lever with large offset**

OF 920gcm  
PT 30°  
OT 45°  
MD 14°  
OP –  
OS 1.5m/s using a 30° cam  
Notes: 1.  $\varnothing 20$ mm plastic roller as standard,  $\varnothing 20$ mm metal roller actuator part no.:511. 2. Lever position adjustable over 360° in 10° increments



**Actuator type 52**  
**Roller lever without offset**

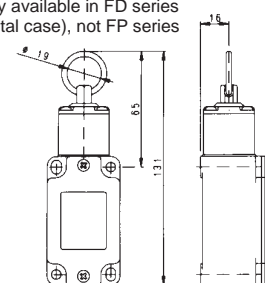
OF 920gcm  
PT 30°  
OT 45°  
MD 14°  
OP –  
OS 1.5m/s  
Notes: 1.  $\varnothing 20$ mm plastic roller as standard,  $\varnothing 20$ mm metal roller actuator part no.:521;  $\varnothing 35$ mm plastic roller actuator part no.:522;  $\varnothing 50$ mm rubber roller actuator part no.:523. 2. Lever position adjustable over 360° in 10° increments



**Actuator type 53**  
**Porcelain roller lever**

OF 615gcm  
PT 30°  
OT 45°  
MD 14°  
OP –  
OS –  
Note: Lever position adjustable over 360° in 10° increments

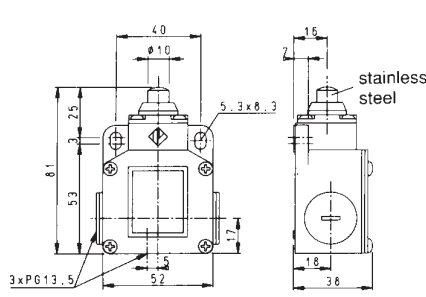
Only available in FD series (metal case), not FP series



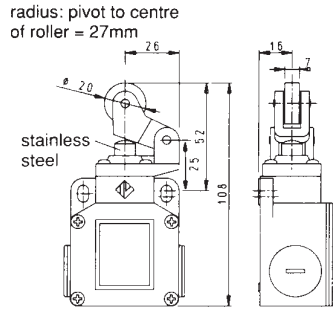
**Actuator type 76**  
**Rope**

OF 2450g  
PT 1.8mm  
OT 6.4mm  
MD 1mm  
OP 66.8mm  
OS –  
Note: Not suitable for safety circuits. For rope operated safety switches, see Safety Limit Switches data sheet on page 297

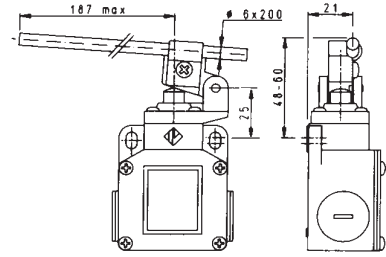
Standard actuator options – FL series



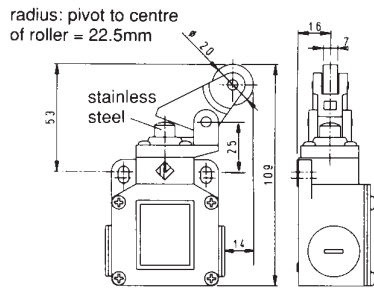
**Actuator type 01**  
**Piston plunger**  
 OF 820g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 23mm  
 OS 0.5m/s



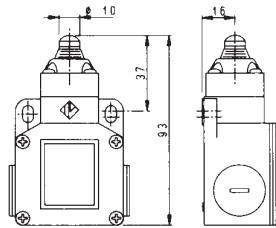
**Actuator type 02**  
**One-way roller - top actuated**  
 OF 615g  
 PT 2.9mm  
 OT 5.6mm  
 MD 1.6mm  
 OP 49.1mm  
 OS 0.5m/s using a 30° cam  
 Note: ø20mm plastic roller as standard, ø20mm metal roller actuator part no.:021



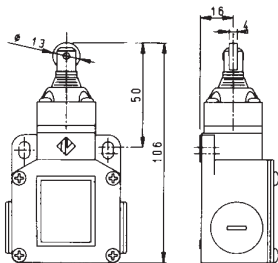
**Actuator type 04**  
**Piston plunger with adjustable glass-fibre rod lever**  
 OF }  
 PT } Variable – dependent on  
 OT } glass-fibre rod position  
 MD }  
 OP }  
 OS }



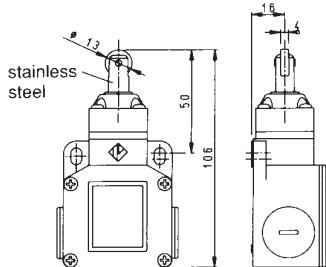
**Actuator type 05**  
**One-way roller - side actuated**  
 OF 615g  
 PT 2.9mm  
 OT 5.6mm  
 MD 1.6mm  
 OP -  
 OS 0.5m/s using a 30° cam  
 Note: ø20mm plastic roller as standard, ø20mm metal roller actuator part no.:051



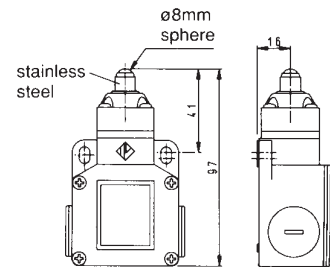
**Actuator type 10**  
**Sealed piston plunger**  
 OF 1125g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 35mm  
 OS 0.5m/s



**Actuator type 15**  
**Sealed roller piston plunger**  
 OF 1125g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 48mm  
 OS 0.5m/s using a 30° cam  
 Note: ø13mm metal roller only

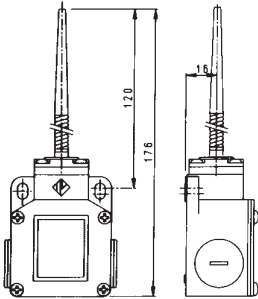


**Actuator type 16**  
**Roller piston plunger**  
 OF 820g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 48mm  
 OS 0.5m/s using a 30° cam  
 Note: ø13mm metal roller only



**Actuator type 18**  
**Rolling ball piston plunger**  
 OF 820g  
 PT 2mm  
 OT 4mm  
 MD 1mm  
 OP 39mm  
 OS 0.5m/s

## Standard actuator options – FL series

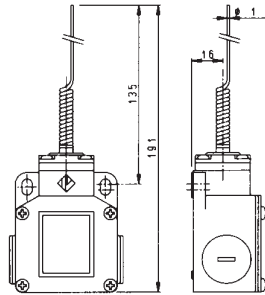


### Actuator type 20

#### Sealed coil spring with flexible rod

OF 125g at  $\frac{2}{3}$  the length of the actuator  
 PT 14°  
 OT –  
 MD 7°  
 OP –  
 OS 1m/s

Notes: Not suitable for safety circuits  
 Not suitable for use with contact blocks 20, 21 or 22

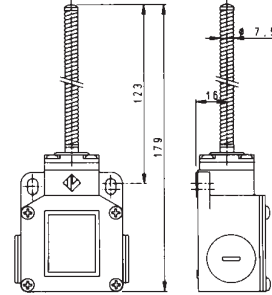


### Actuator type 21

#### Sealed coil spring with cat's whisker

OF 92g at  $\frac{2}{3}$  the length of the actuator  
 PT 14°  
 OT –  
 MD 7°  
 OP –  
 OS 1m/s

Notes: Not suitable for safety circuits  
 Not suitable for use with contact blocks 20, 21 or 22

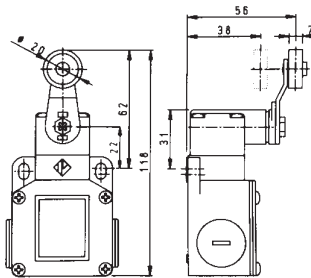


### Actuator type 25

#### Sealed coil spring

OF 195g at  $\frac{2}{3}$  the length of the actuator  
 PT 14°  
 OT –  
 MD 7°  
 OP –  
 OS 1m/s

Notes: Not suitable for safety circuits  
 Not suitable for use with contact blocks 20, 21 or 22

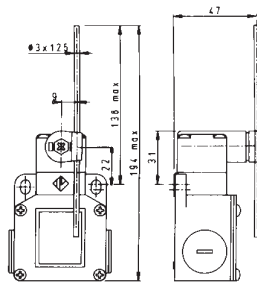


### Actuator type 31

#### Roller lever with small offset

OF 1530gcm  
 PT 30°  
 OT 45°  
 MD 14°  
 OP –  
 OS 1.5m/s using a 30° cam

Notes: 1.  $\varnothing 20$ mm plastic roller as standard,  $\varnothing 20$ mm metal roller actuator part no.:311;  $\varnothing 35$ mm plastic roller actuator part no.:312;  $\varnothing 50$ mm rubber roller actuator part no.:313. 2. Lever position adjustable over 360° in 10° increments

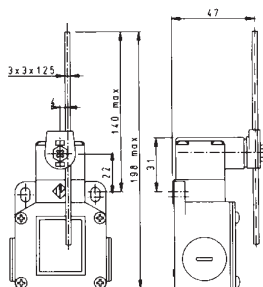


### Actuator type 32

#### Adjustable round steel rod lever

OF 1530gcm  
 PT 30°  
 OT 45°  
 MD 14°  
 OP –  
 OS 1.5m/s

Note: Lever position adjustable over 360° in 10° increments

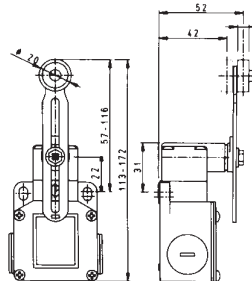


### Actuator type 33

#### Adjustable square steel rod lever

OF 1530gcm  
 PT 30°  
 OT 45°  
 MD 14°  
 OP –  
 OS 1.5m/s

Note: Lever position adjustable over 360° in 10° increments

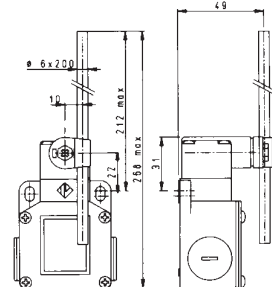


### Actuator type 35

#### Adjustable roller lever

OF 1530gcm  
 PT 30°  
 OT 45°  
 MD 14°  
 OP –  
 OS 1.5m/s using a 30° cam

Notes: 1.  $\varnothing 20$ mm plastic roller as standard,  $\varnothing 20$ mm metal roller actuator part no.:351;  $\varnothing 35$ mm plastic roller actuator part no.:352;  $\varnothing 50$ mm rubber roller actuator part no.:353. 2. Lever position adjustable over 360° in 10° increments



### Actuator type 36

#### Adjustable glass-fibre rod lever

OF 1530gcm  
 PT 30°  
 OT 45°  
 MD 14°  
 OP –  
 OS 1.5m/s

Notes: 1. Not suitable for safety circuits.  
 2. Lever position adjustable over 360° in 10° increments



## Lift-style switches

**EXAMPLES**

**FD538 or FD5385 or FD938 + L313**  
**FP538 or FP938 + L313**  
**Turret type 38**  
**Lever type L313 (fixed position roller)**

**FD538 or FD5385 or FD938 + L353**  
**FP538 or FP938 + L353**  
**Turret type 38**  
**Lever type L353 (single adjustment roller)**

**FD538 or FD5385 or FD938 + L354**  
**FP538 or FP938 + L354**  
**Turret type 38**  
**Lever type L354 (dual adjustment roller)**

- Three lever options.
- FL model also available with a choice of lever.
- Age-resistant and oil-resistant rubber rollers.
- Lever position adjustable over 360° in 10° increments.
- Head rotatable in 90° increments.
- User-selectable to switch by clockwise movement only, anti-clockwise only, or both.
- Glass-reinforced thermoplastic resin model (FP) double insulated for electrical safety.
- Die-cast metal alloy models (FD and FL) include earth terminal.

Types L353 and L354 have a location slot at the end to lock the levers at full extension if required.

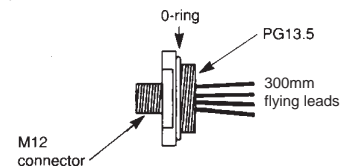
## Replacement contact blocks

B5	INO+INC	Positive break	→ Zb
	13 21 14 22	Snap action standard contact block	
B6	INO+INC	Positive break	→ Zb
	13 21 14 22	Slow action break before make	
B7	INO+INC	Positive break	→ Zb
	13 21 14 22	Slow action make before break	
B9	2NC	Positive break	→ Zb
	11 21 12 22	Slow action, contacts 11-12, 21-22 open at the same time	
B14	2NC	Positive break	→ Zb
	11 21 12 22	Slow action, contacts 11-12 open first, further actuator travel causes contacts 21-22 to open	
B10	2NO	Slow action, contacts	→ Zb
	13 23 14 24	13-14, 23-24 close at the same time	
B15	2NO	Slow action, contacts	→ Zb
	13 23 14 24	13-14 close first, further actuator travel causes contacts 23-24 to close	
B2	2NO+2NC	Snap action, double pole	→ Zb
	13 21 43 31 14 22 44 32		

## Plug and socket limit switches

All FD/FP/FL series limit switches can be converted to a plug-in style by the addition of an adaptor.

**Part number**  
**8R4D26E03C3003**



The adaptor is screwed into the limit switch and the four flying leads connected to the four terminals of the contact block.  
 Suitable 4-wire plug leads are available – see pages 332 to 335.  
**Ratings**

250VAC/300VDC  
 3A  
 IP67

## Cable glands

Cable glands are available to enable standard multi-core cables to be connected without the use of conduit. Three sizes are possible:

**Part number PG13.5** Cable size  $\varnothing$ 9-12mm **Part number PG13.5/6** Cable size  $\varnothing$ 6-9mm  
**Part number G13.5** Cable size  $\varnothing$ 9-12mm (type FD only)

