Description

The microswitches of MK series have been designed to add new features to traditional and tested microswitches by Pizzato Elettrica.

The absolute new feature of this series is the enhanced and state-of-the-art trigger mechanism, whose design features are of higher quality in comparison to other solutions available on the market.

Thanks to the double and redundant execution, the electrical contact of the microswitch has been designed with a technology providing increased reliability, and is able to carry out switching operations with positive opening. Inside the housing of the microswitch it is possible to insert gaskets to protect the mechanism against fine dusts or liquids up to the protection degree IP65. Conductor fixing terminals are more practical, allowing for cables of different diameters to be fixed or the choice of different bends for the Faston contacts.

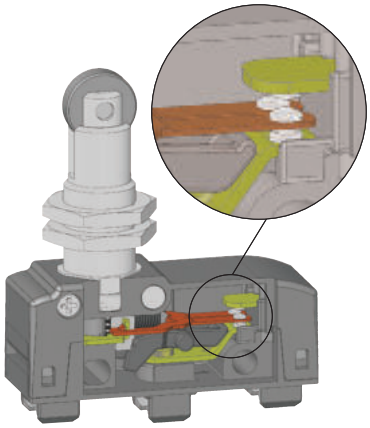
Contact reliability

In the following table a typical contact structure for a microswitch normally used in the industry (type A) is shown compared with the solution implemented by Pizzato Elettrica in the MK series microswitches: mobile contact with single interruption and double contacts (type B). As you can see from the table below, in the latter contact structure (type B) the contact resistance (R) is only half in comparison to the mobile contact with single interruption (type A), and presents a very low failure probability (fe) as well.

With a failure probability of x for a single switching operation, the failure probability for type A is fe=x, for type B fe =≅x^2. This means that if the probability of a switching failure is x in a given situation, e.g., $1x10^{-4}$, (1 switching failure in 10,000), the result is as follows:

- for type A one failed commutation every 10,000.
- for type B one failed commutation every 100,000,000.

Type	Diagram	Description	Contact resistance R	Probability of errors fe
A Common micro-switch	NO COMMON NC	mobile contact with single interruption	R=Rc	fe=x
B Pizzato's micro-switch MK series	NO COMMON NC	mobile contact with single interruption and double contacts	R=Rc/2	fe ≅ x^2

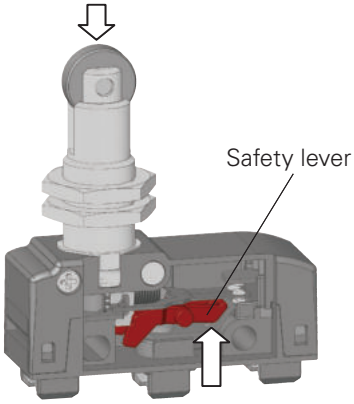


Extended temperature range

-40°C

The MK series includes versions with extended temperature range available upon request. Compared to the standard MK microswitches with temperature ranges from -25 C° to +85 C°, these special versions are suitable for environments with temperature ranges from -40 C° to +85 °C. They can therefore be installed inside cold stores, sterilizers or other equipment with very low ambient temperature. The special materials used to produce these versions retain their characteristics even under these conditions, thereby expanding the installation possibilities.

Microswitches for safety applications

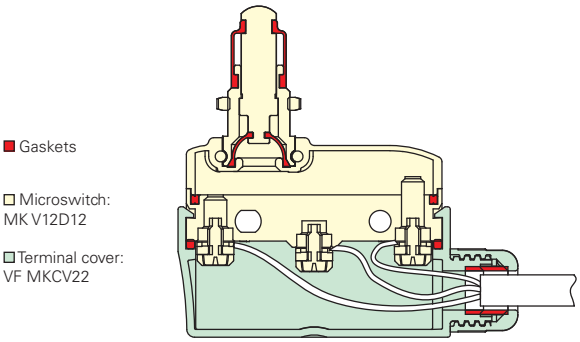


All microswitches showing the symbol ⊖ besides the product code are with positive opening and therefore suitable for safety applications. These microswitches are provided with a rigid connection between the plunger and the NC contacts, which are forcibly actuated by a internal sturdy safety lever.

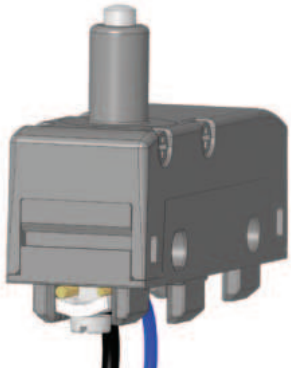
The positive opening has been designed in compliance with the standard EN 60947-5-1, Annex K. Therefore, these microswitches are suitable for safety applications.

Protection degree IP65

By installing microswitches MK ••2••• with terminal covers VF MKC•22 or terminal covers VF MKC•23, a microswitch fully protected against water and dust is obtained. Thanks to their special oil resistant rubber gaskets the protection degree IP65 is provided. For applications in very dirty environments there are also versions with integrated double gasket for the plunger (internal + external). e.g. MK ••2•12 or MK ••2•13.



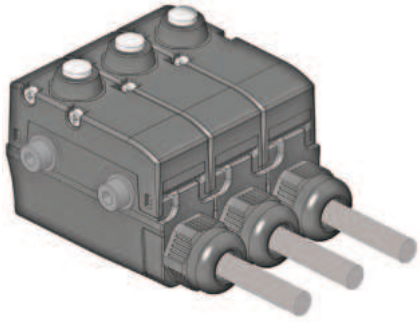
Clamping screw plates for cables of different diameters (MK V•)

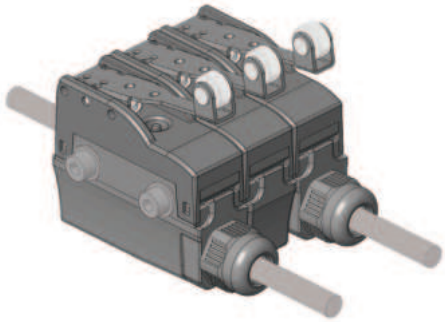


The clamping screw plates are provided with a particular "roofing tile" structure and are loosely coupled to the clamping screw. The design causes connection wires of different diameter to be pulled towards the screw when tightening the screw (see figure), preventing the wires from escaping towards the outside.

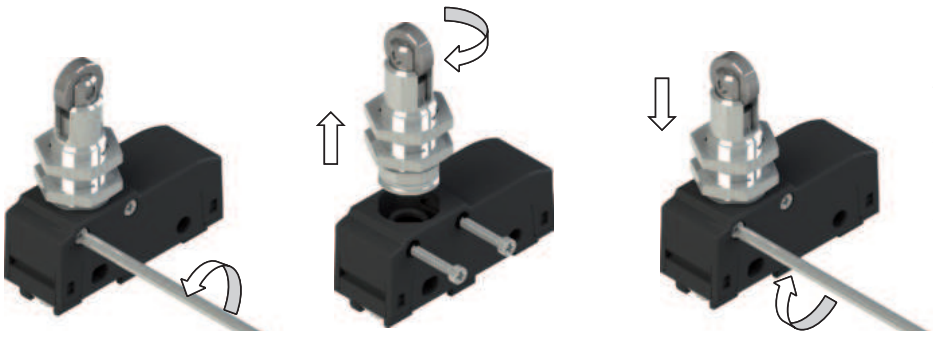
Terminal covers with side-by-side strain relief cable gland

The terminal covers are provided with strain relief cable gland and protection degree up to IP65. These are snap-on terminal covers and have reduced dimensions contained in the profile of the microswitch so that these can be installed on microswitches fixed side by side as well.





Actuators with variable orientation



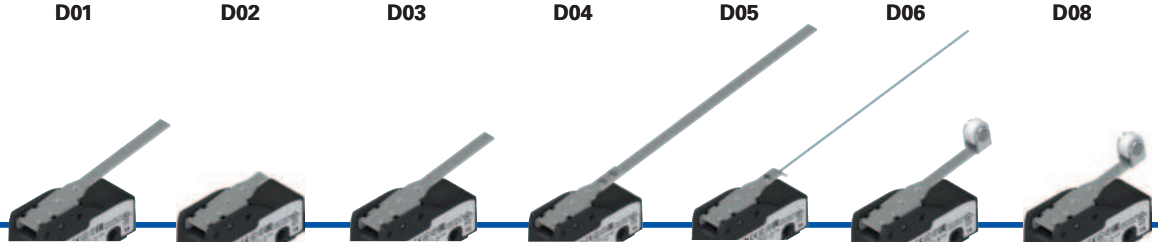
Thanks to the patented lateral fixing system, the roller of the microswitches MK •••15 and MK ••17 can be now rotated in 90° steps.

The lateral fixing allows to disconnect the actuator from the switch body even when the actuator is already fixed to the support bracket. The flexibility of the product also allows for products to be unified in the warehouse for applications that require castors both in the longitudinal or transverse direction.

PLUNGER DIRECT ACTUATION

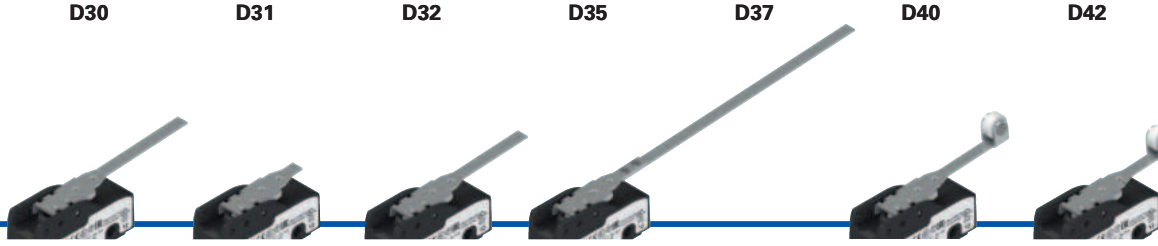
D01 D02 D03 D04 D05 D06 D08

LEVER DIRECT ACTUATION



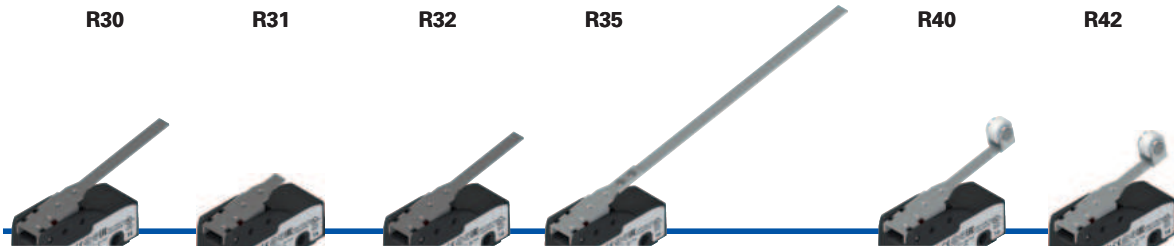
D30 D31 D32 D35 D37 D40 D42

LEVER INVERTED ACTUATION



R30 R31 R32 R35 R40 R42

LEVER DIRECT ACTUATION ATTHE BACK



F30 F31 F32 F35 F40 F42

ACTUATORS

1
1NO+1NC, snap action

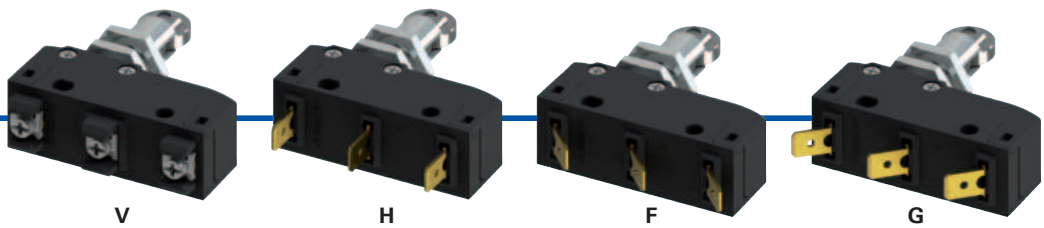
2
1NO, snap action
(on request)

3
1NC, snap action
(on request)

Product options

Sold separately as accessory

TERMINALS



V
Screw with
self-lifting plate

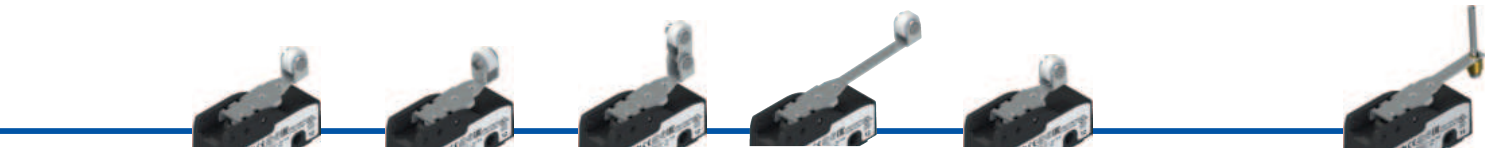
H
Faston 6.3 mm, vertical

F
Faston 6.3 mm
45° bend to the right

G
Faston 6.3 mm
45° bend to the left
(on request)

D09 **D10** **D12** External gasket **D13** External gasket **D15** **D17** **D18** **D19**

D45 **D46** **D47** **D53** **D59** **D49**



R45 **R46** **R47** **R53** **R59** **R60**

F45 **F46** **F47** **F53** **F59** **F49**

Code structure

Attention! The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office.

article | options

MK V12D40-GR16T6

Terminal type	
V	screw with self-lifting plate
H	vertical faston
F	Faston, 45° bend to the right
G	Faston, 45° bend to the left (on request)

Contact block	
1	1NO+1NC, snap action, change-over
2	1NO, snap action (on request)
3	1NC, snap action (on request)

Maximum protection degree	
1	IP40 (with terminal cover)
2	IP65 (with terminal cover)

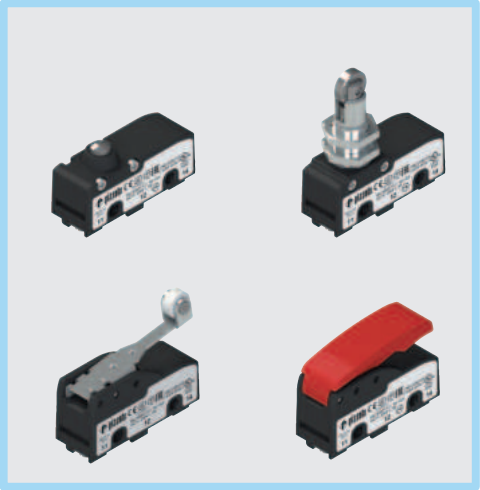
Type of actuation	
D	direct actuation
R	inverted actuation
F	direct actuation at the back

Actuator	
01	pin
02	pin
03	narrow plunger
...	...

Contact type	
	silver contacts (standard)
G	silver contacts, 1 µm gold coating

Rollers	
	standard roller
R16	metal roller Ø 9.5x4 mm (for actuators 40, 42, 45, 46, 47, 53, 59 only)
R10	large plastic roller Ø 9.8x8.4 mm (for actuators 40, 42, 45, 53 only)

Ambient temperature	
	-25°C ... +85°C (standard)
T6	-40°C ... +85°C



Main features

- Technopolymer housing
- High reliability contacts
- Protection degree up to IP65
- 4 terminal types available
- 52 actuators available
- Versions with positive opening ⊖
- Versions with gold-plated silver contacts
- Terminal covers with strain relief cable gland

Quality marks:

IMQ approval:	CA02.05772
UL approval:	E131787
CCC approval:	2024010305654837
EAC approval:	RU Д-IT.PA07.B.37848/24

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing and shock-proof.

Protection degree acc. to EN 60529:	IP00 without terminal cover
	IP20 (with terminal covers VF C01, VF C03)
	IP40 (with terminal covers VF MKC•1•, VF C02)
	IP65 (with terminal covers VF MKC•22 + MK V•2••• or VF MKC•23 + MK H•2•••)

General data

Ambient temperature:	-25°C … +85°C (standard)
	-40°C … +85°C (T6 option)
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	10 million operating cycles
Safety parameter B_{10D}:	20,000,000 for NC contacts
Tightening torques for installation:	see page 229

Conductor cross section (flexible copper strands)

MK series:	min. 1 x 0.34 mm²	(1 x AWG 22)
	max. 2 x 1.5 mm²	(2 x AWG 16)

Wire stripping length (x):

MK V••••• articles (screw connection): 7 mm

In compliance with standards:

IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529, EN 60947-1, IEC 60947-1, EN IEC 63000.

Approvals:

UL 508, CSA C22.2 No. 14, EN 60947-1, EN 60947-5-1.

Compliance with the requirements of:

Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU.

Positive contact opening in conformity with standards:

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

Installation for safety applications:

Use only microswitches marked with the ⊖ symbol beside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts) as required by **EN ISO 14119, paragraph 5.4** for specific interlock applications **and EN ISO 13849-2 tables D3 (well-tried components) and D.8 (fault exclusions)** for safety applications in general. Actuate the switch **at least up to the positive opening travel (CAP)** reported next to the article code. Actuate the switch **at least with the positive opening force (FAP)** reported next to the article code.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter Utilization requirements from page 217 to page 232.**

Electrical data

Thermal current (I_{th}):	16 A
Rated insulation voltage (U_i):	250 Vac 300 Vdc
Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Protection against short circuits:	type gG fuse 16 A 250 V
Pollution degree:	3
Dielectric strength	2000 Vac/min.

Utilization category

Alternating current: AC15 (50 … 60 Hz)

Ue (V)	120	250
Ie (A)	3	5

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	4	0.6	0.3

Features approved by IMQ

Rated insulation voltage (U_i):	250 Vac
Conventional free air thermal current (I_{th}):	16 A
Protection against short circuits:	type gG fuse 16 A 250 V
Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A
Protection degree of the housing:	IP00
Terminals:	screw terminals / faston terminals
Pollution degree:	3
Utilization category:	AC15
Operating voltage (Ue):	250 Vac (50 Hz)
Operating current (Ie):	5 A

Forms of the contact element: A, B, C.
Positive opening of contacts on contact blocks: 1, 3.
In compliance with standards: EN 60947-1, EN 60947-5-1, fundamental requirements of the Low Voltage Directive 2014/35/EU.

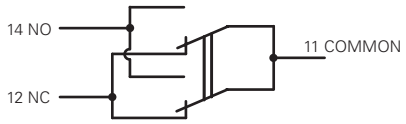
Please contact our technical department for the list of approved products.

Features approved by UL

Electrical Ratings: Q300 pilot duty (69 VA, 125-250 Vdc)
A300 pilot duty (720 VA, 120 … 300 V ac)

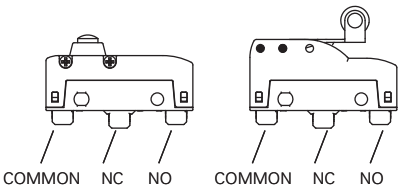
Please contact our technical department for the list of approved products.

Circuit diagram

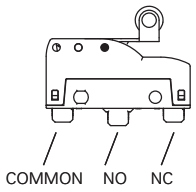


Mobile contact with single interruption and double contacts

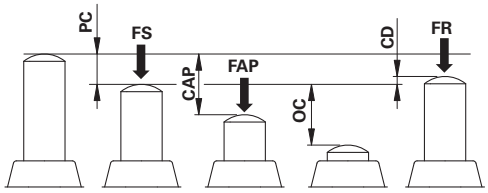
With direct actuation and direct actuation at the back (F, D)

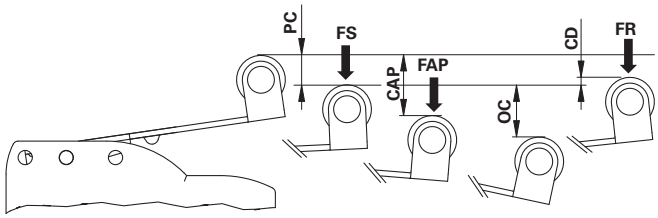


With inverted actuation (R)



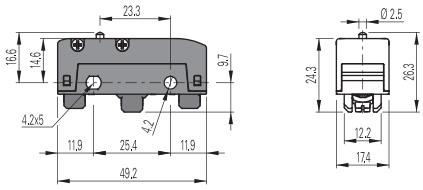
Actuation forces and travels





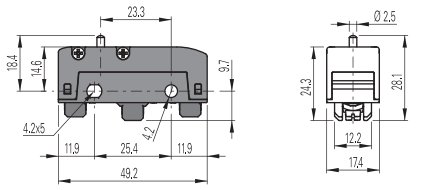
PC pre-travel
CAP positive opening travel
OC over-travel
CD differential travel
FS trigger force
FR release force
FAP positive opening force

Microswitches with direct actuation



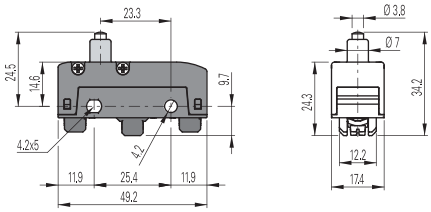
MK V11D01	1NO+1NC	PC	0.5 mm	FS	4 N
		OC	1.5 mm	FR	3 N
		CD	0.05 mm		

Maximum and minimum speed see page 389 - type 1



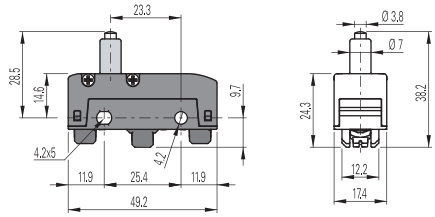
MK V11D02	1NO+1NC	PC	0.5 mm	FS	4 N
		OC	2 mm	FR	3 N
		CD	0.05 mm		

Maximum and minimum speed see page 389 - type 1



MK V11D03	1NO+1NC	PC	0.5 mm	FS	4 N
		OC	2 mm	FR	3 N
		CD	0.05 mm		

Maximum and minimum speed see page 389 - type 1



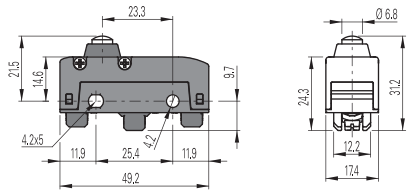
MK V11D04	1NO+1NC	PC	0.5 mm	FS	4 N
		OC	2 mm	FR	3 N
		CD	0.05 mm		

Maximum and minimum speed see page 389 - type 1

All values in the drawings are in mm

Accessories See page 195

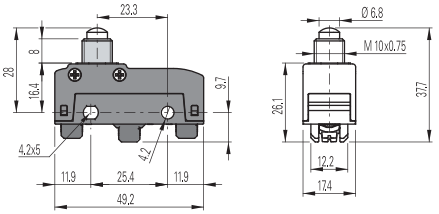
➔ The 2D and 3D files are available at **www.pizzato.com**



MK V11D05 1NO+1NC

PC	0.5 mm	FS	4 N
OC	2 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

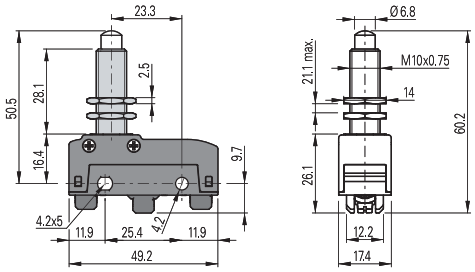
Maximum and minimum speed see page 229 - type 1



MK V11D06 1NO+1NC

PC	0.5 mm	FS	4 N
OC	3 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

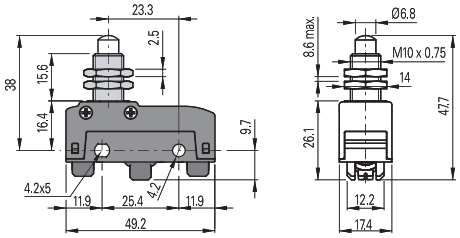
Maximum and minimum speed see page 229 - type 1



MK V11D08 1NO+1NC

PC	0.5 mm	FS	4 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

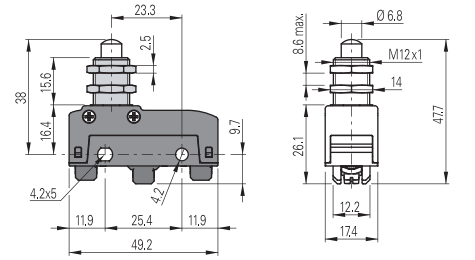
Maximum and minimum speed see page 229 - type 1



MK V11D09 1NO+1NC

PC	0.5 mm	FS	4 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

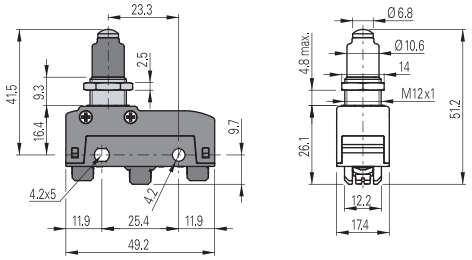
Maximum and minimum speed see page 229 - type 1



MK V11D10 1NO+1NC

PC	0.5 mm	FS	4 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

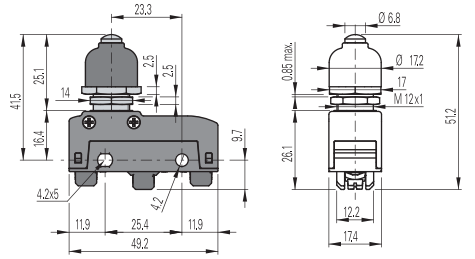
Maximum and minimum speed see page 229 - type 1



MK V11D12 1NO+1NC

PC	0.5 mm	FS	4.5 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

Maximum and minimum speed see page 229 - type 1

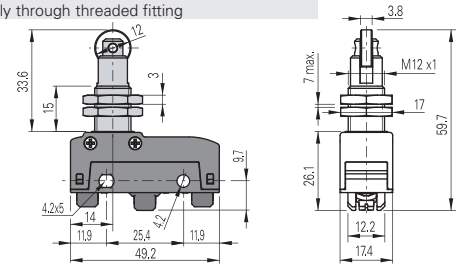


MK V11D13 1NO+1NC

PC	0.6 mm	FS	6 N
OC	5.4 mm	FR	4 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

Maximum and minimum speed see page 229 - type 1

Mounting only through threaded fitting

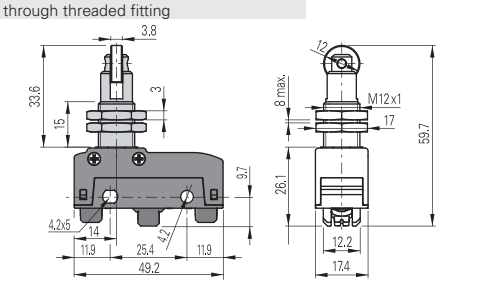


MK V11D15 1NO+1NC

PC	0.5 mm	FS	4 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

Maximum and minimum speed see page 229 - type 2

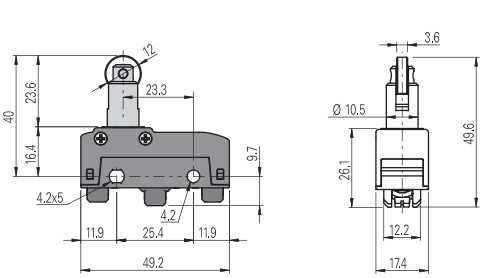
Mounting only through threaded fitting



MK V11D17 1NO+1NC

PC	0.5 mm	FS	4 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

Maximum and minimum speed see page 229 - type 2



MK V11D18 1NO+1NC

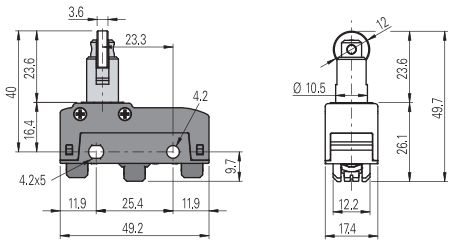
PC	0.5 mm	FS	4 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

Maximum and minimum speed see page 229 - type 2

All values in the drawings are in mm

Accessories See page 195

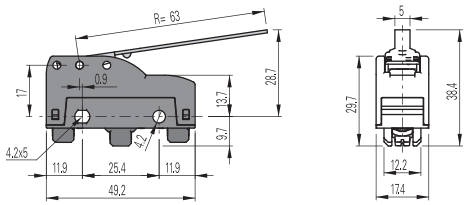
→ The 2D and 3D files are available at **www.pizzato.com**



MK V11D19 1NO+1NC

PC	0.5 mm	FS	4 N
OC	5.5 mm	FR	3 N
CD	0.05 mm	FAP	20 N
CAP	2.2 mm		

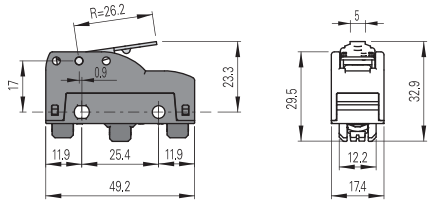
Maximum and minimum speed see page 229 - type 2



MK V11D30 1NO+1NC

PC	11.5 mm	FS	0.65 N
OC	7.6 mm	FR	0.5 N
CD	1.1 mm		

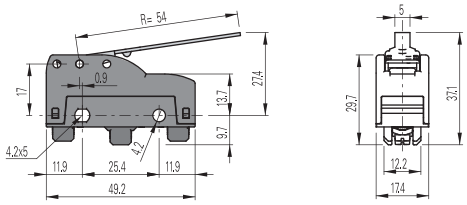
Maximum and minimum speed see page 229 - type 3



MK V11D31 1NO+1NC

PC	4.6 mm	FS	1.66 N
OC	3.8 mm	FR	1.32 N
CD	0.4 mm		

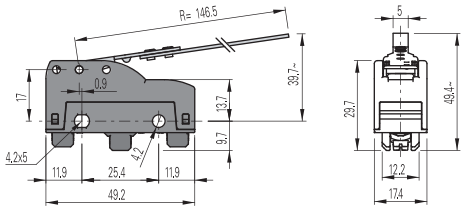
Maximum and minimum speed see page 229 - type 3



MK V11D32 1NO+1NC

PC	9.1 mm	FS	0.76 N
OC	7.1 mm	FR	0.58 N
CD	0.9 mm		

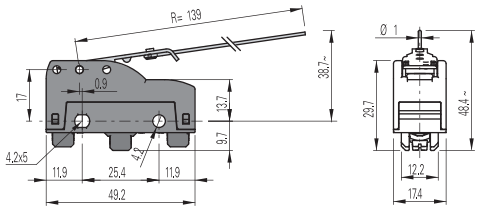
Maximum and minimum speed see page 229 - type 3



MK V11D35 1NO+1NC

PC	26.2 mm	FS	0.28 N
OC	13.7 mm	FR	0.22 N
CD	2.5 mm		

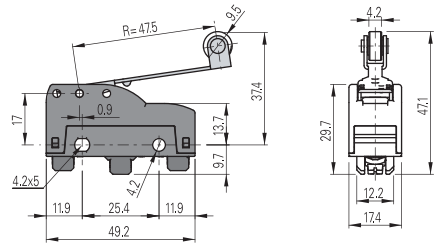
Maximum and minimum speed see page 229 - type 3



MK V11D37 1NO+1NC

PC	24.8 mm	FS	0.08 N
OC	3.8 mm	FR	0.04 N
CD	4.1 mm		

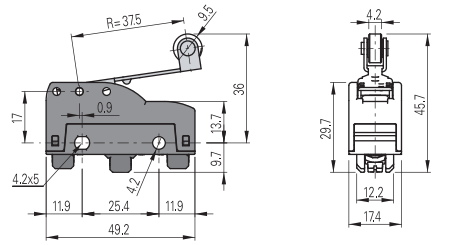
Maximum and minimum speed see page 229 - type 3



MK V11D40 1NO+1NC

PC	8.2 mm	FS	0.86 N
OC	6.1 mm	FR	0.66 N
CD	0.8 mm		

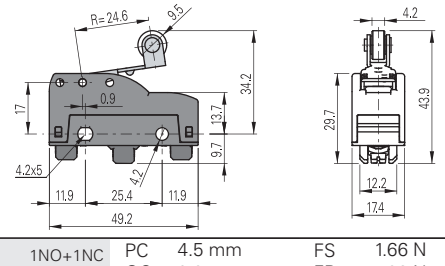
Maximum and minimum speed see page 229 - type 6



MK V11D42 1NO+1NC

PC	6.5 mm	FS	1.09 N
OC	4.8 mm	FR	0.84 N
CD	0.6 mm		

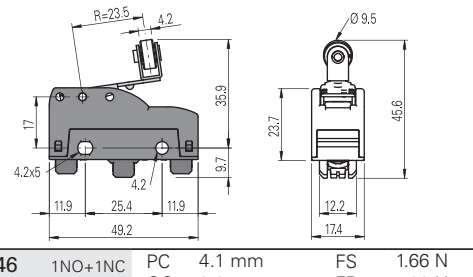
Maximum and minimum speed see page 229 - type 6



MK V11D45 1NO+1NC

PC	4.5 mm	FS	1.66 N
OC	3.2 mm	FR	1.28 N
CD	0.4 mm		

Maximum and minimum speed see page 229 - type 6



MK V11D46 1NO+1NC

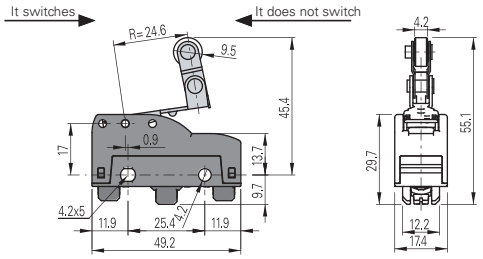
PC	4.1 mm	FS	1.66 N
OC	3.8 mm	FR	1.28 N
CD	0.4 mm		

Maximum and minimum speed see page 229 - type 6

All values in the drawings are in mm

Accessories See page 195

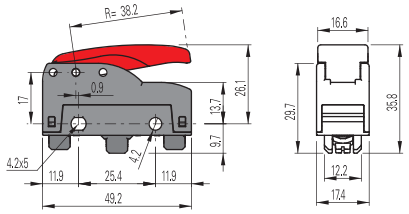
→ The 2D and 3D files are available at **www.pizzato.com**



MK V11D47 1NO+1NC

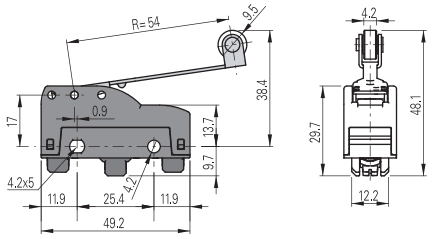
PC	4.2 mm	FS	1.66 N
OC	2.8 mm	FR	1.28 N
CD	0.4 mm		

Maximum and minimum speed see page 229 - type 6



MK V11D49 1NO+1NC Hand operated

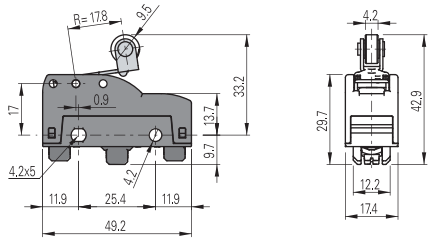
Maximum and minimum speed see page 229 - type 3



MK V11D53 1NO+1NC

PC	7.7 mm	FS	0.76 N
OC	7.8 mm	FR	0.58 N
CD	0.9 mm		

Maximum and minimum speed see page 229 - type 6

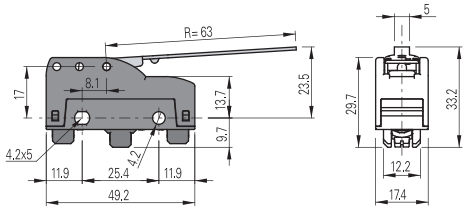


MK V11D59 1NO+1NC

PC	2.3 mm	FS	2.3 N
OC	4.5 mm	FR	1.77 N
CD	0.2 mm		

Maximum and minimum speed see page 229 - type 6

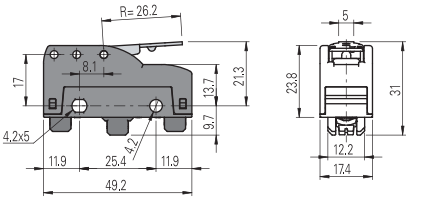
Microswitches with inverted actuation



MK V11R30 1NO+1NC

PC	5 mm	FS	0.6 N
OC	14 mm	FR	0.4 N
CD	0.7 mm		

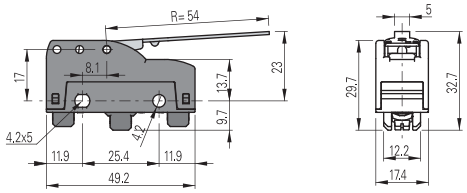
Maximum and minimum speed see page 229 - type 4



MK V11R31 1NO+1NC

PC	1.9 mm	FS	1.47 N
OC	5.1 mm	FR	0.72 N
CD	0.23 mm		

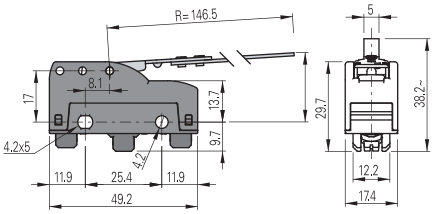
Maximum and minimum speed see page 229 - type 4



MK V11R32 1NO+1NC

PC	4.1 mm	FS	0.7 N
OC	11.2 mm	FR	0.5 N
CD	0.8 mm		

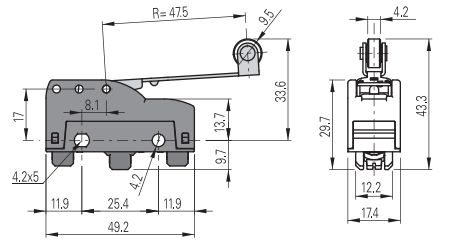
Maximum and minimum speed see page 229 - type 4



MK V11R35 1NO+1NC

PC	13.4 mm	FS	0.3 N
OC	24.3 mm	FR	0.2 N
CD	2.1 mm		

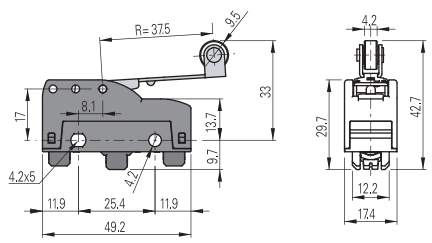
Maximum and minimum speed see page 229 - type 7



MK V11R40 1NO+1NC

PC	2.8 mm	FS	0.8 N
OC	10.9 mm	FR	0.5 N
CD	0.45 mm		

Maximum and minimum speed see page 229 - type 7



MK V11R42 1NO+1NC

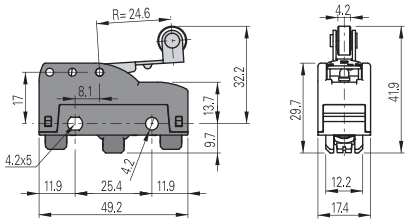
PC	2.7 mm	FS	1.2 N
OC	8.4 mm	FR	1.7 N
CD	0.5 mm		

Maximum and minimum speed see page 229 - type 7

All values in the drawings are in mm

Accessories See page 195

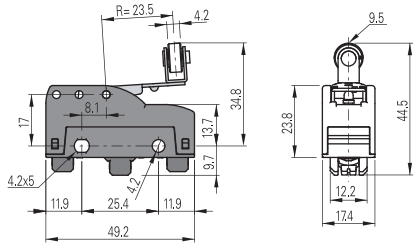
→ The 2D and 3D files are available at **www.pizzato.com**



MK V11R45 1NO+1NC

PC	1.5 mm	FS	1.7 N
OC	5.5 mm	FR	1 N
CD	0.3 mm		

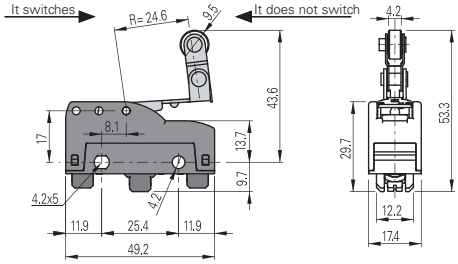
Maximum and minimum speed see page 229 - type 7



MK V11R46 1NO+1NC

PC	1.7 mm	FS	1.8 N
OC	4.8 mm	FR	1.1 N
CD	0.3 mm		

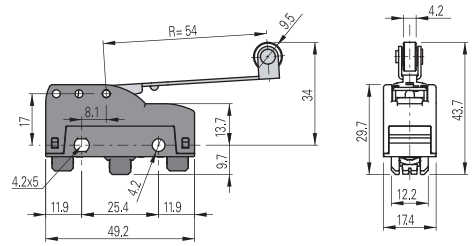
Maximum and minimum speed see page 229 - type 7



MK V11R47 1NO+1NC

PC	1.7 mm	FS	1.7 N
OC	5.3 mm	FR	1 N
CD	0.3 mm		

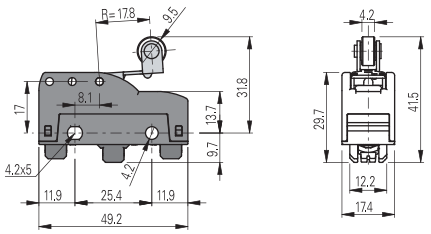
Maximum and minimum speed see page 229 - type 7



MK V11R53 1NO+1NC

PC	3.6 mm	FS	0.8 N
OC	11.2 mm	FR	0.4 N
CD	0.5 mm		

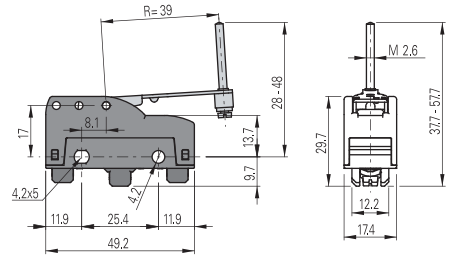
Maximum and minimum speed see page 229 - type 7



MK V11R59 1NO+1NC

PC	1.5 mm	FS	2.4 N
OC	3.9 mm	FR	1.3 N
CD	0.2 mm		

Maximum and minimum speed see page 229 - type 7

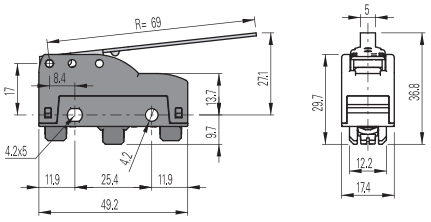


MK V11R60 1NO+1NC

PC	2.7 mm	FS	1.2 N
OC	9.2 mm	FR	0.6 N
CD	0.5 mm		

Maximum and minimum speed see page 229 - type 4

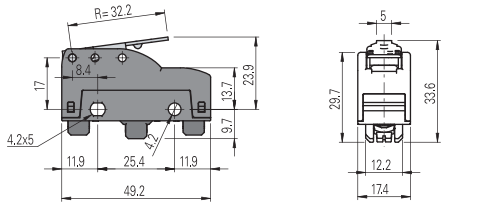
Microswitches with direct actuation at the back



MK V11F30 1NO+1NC

PC	3.2 mm	FS	0.6 N
OC	11.2 mm	FR	0.5 N
CD	0.35 mm		

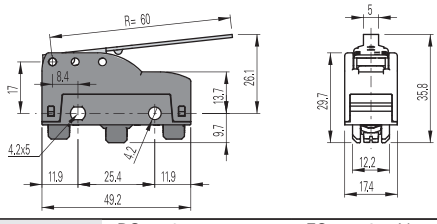
Maximum and minimum speed see page 229 - type 5



MK V11F31 ➔ 1NO+1NC

PC	1.45 mm	FS	1.5 N
OC	5 mm	FR	0.92 N
CD	0.17 mm	FAP	5.78 N
CAP	5.72 mm		

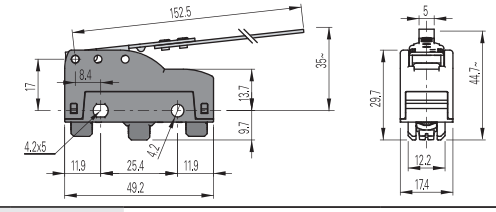
Maximum and minimum speed see page 229 - type 5



MK V11F32 1NO+1NC

PC	2.7 mm	FS	0.7 N
OC	9.3 mm	FR	0.6 N
CD	0.4 mm		

Maximum and minimum speed see page 229 - type 5



MK V11F35 1NO+1NC

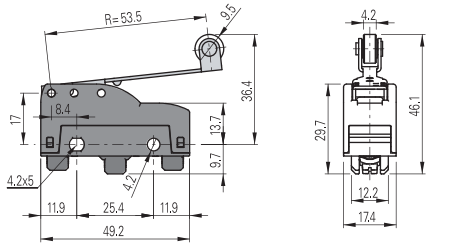
PC	7.8 mm	FS	0.25 N
OC	24.1 mm	FR	0.2 N
CD	1.7 mm		

Maximum and minimum speed see page 229 - type 5

All values in the drawings are in mm

Accessories See page 195

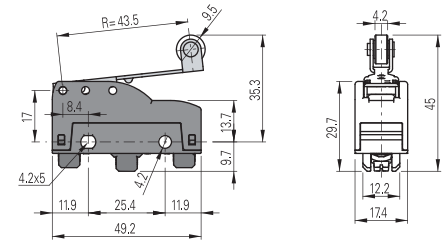
➔ The 2D and 3D files are available at **www.pizzato.com**



MK V11F40 1NO+1NC

PC	2.1 mm	FS	0.85 N
OC	8.3 mm	FR	0.65 N
CD	0.25 mm		

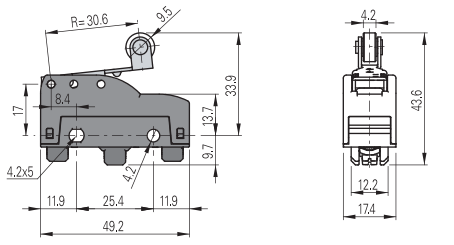
Maximum and minimum speed see page 229 - type 8



MK V11F42 1NO+1NC

PC	1.8 mm	FS	1 N
OC	6.7 mm	FR	0.7 N
CD	0.2 mm	FAP	4.9 N
CAP	8 mm		

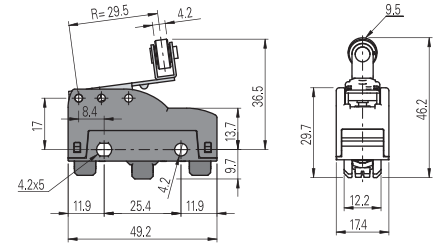
Maximum and minimum speed see page 229 - type 8



MK V11F45 1NO+1NC

PC	1.1 mm	FS	1.5 N
OC	4.9 mm	FR	0.9 N
CD	0.1 mm	FAP	6.9 N
CAP	5.8 mm		

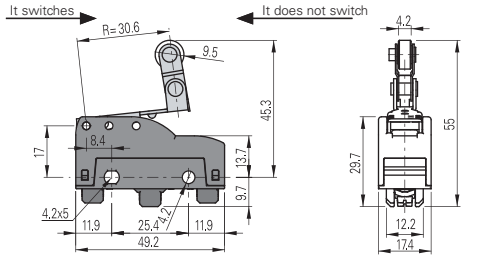
Maximum and minimum speed see page 229 - type 8



MK V11F46 1NO+1NC

PC	1.3 mm	FS	1.6 N
OC	4.7 mm	FR	0.9 N
CD	0.1 mm	FAP	6.9 N
CAP	5.8 mm		

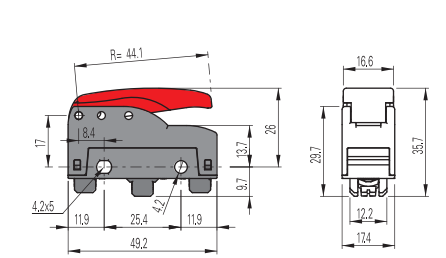
Maximum and minimum speed see page 229 - type 8



MK V11F47 1NO+1NC

PC	1.3 mm	FS	1.6 N
OC	4.7 mm	FR	0.9 N
CD	0.1 mm	FAP	6.9 N
CAP	5.8 mm		

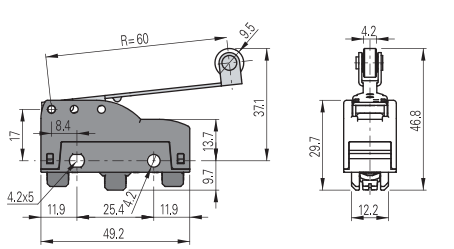
Maximum and minimum speed see page 229 - type 8



MK V11F49 1NO+1NC

PC	1.5 mm	FS	1 N
OC	7.5 mm	FR	0.7 N
CD	0.2 mm	FAP	4.8 N
CAP	8 mm		

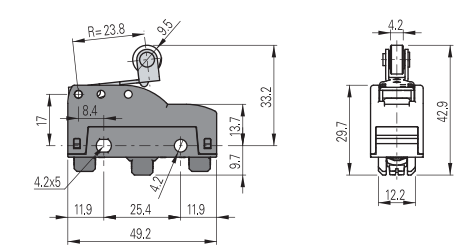
Maximum and minimum speed see page 229 - type 5



MK V11F53 1NO+1NC

PC	2.5 mm	FS	0.7 N
OC	9.3 mm	FR	0.6 N
CD	0.3 mm		

Maximum and minimum speed see page 229 - type 8



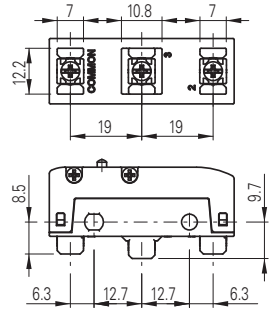
MK V11F59 1NO+1NC

PC	0.8 mm	FS	1.9 N
OC	4.5 mm	FR	1.3 N
CD	0.08 mm	FAP	8.9 N
CAP	4.9 mm		

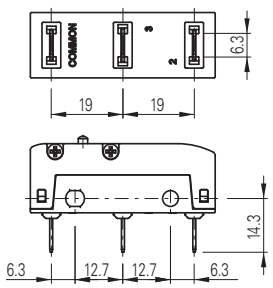
Maximum and minimum speed see page 229 - type 8

Terminal dimensions

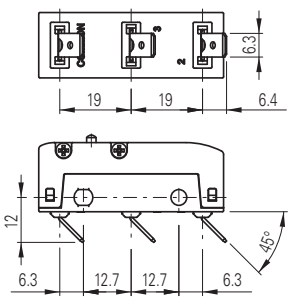
All values in the drawings are in mm



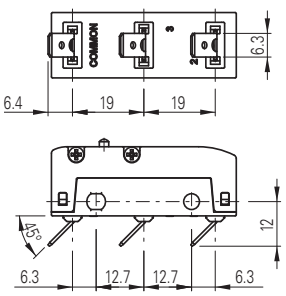
Screw terminals **V** with plate



Faston terminals **H**, vertical



Faston terminals **F**, right angle

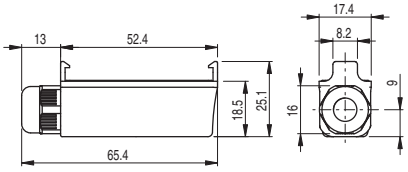


Faston terminals **G**, left angle (upon request)

Note: The vertical faston terminals H can be bent according to specific installation requirements.
We recommend to bend the faston with an angle not higher than 45° and to carry out this operation no more than 5 times.

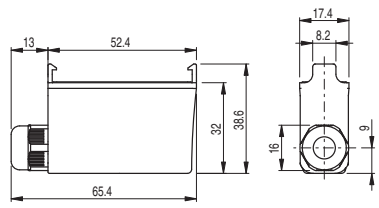
Protective terminal covers

Packs of **10 pcs.**



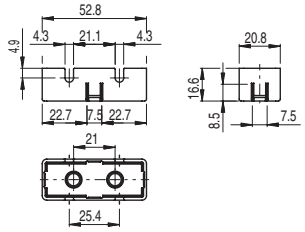
Protective terminal cover for screw terminals with strain relief cable gland and snap-in mounting. It allows installation of multiple switches side-by-side.

Article	Description	Protection degree
VF MKCV11	Protective terminal cover without gasket for multipolar cables Ø 5 … 7.5 mm	IP40
VF MKCV12	Protective terminal cover without gasket for multipolar cables Ø 4 … 7.5 mm	IP40
VF MKCV13	Protective terminal cover without gasket for multipolar cables Ø 2 … 5.5 mm	IP40
VF MKCV22	Protective terminal cover with gasket for multipolar cables Ø 4 … 7.5 mm	IP65
VF MKCV23	Protective terminal cover with gasket for multipolar cables Ø 2 … 5.5 mm	IP65

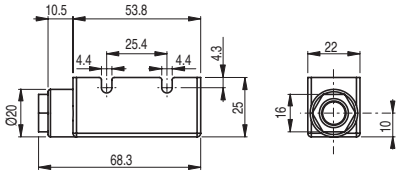


Protective terminal cover for vertical faston terminals with strain relief cable gland and snap-in mounting. It allows installation of multiple switches side-by-side.

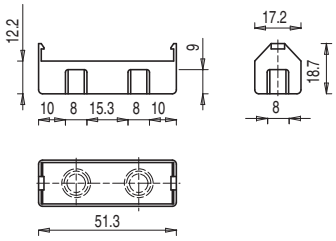
Article	Description	Protection degree
VF MKCH11	Protective terminal cover without gasket for multipolar cables Ø 5 … 7.5 mm	IP40
VF MKCH12	Protective terminal cover without gasket for multipolar cables Ø 4 … 7.5 mm	IP40
VF MKCH13	Protective terminal cover without gasket for multipolar cables Ø 2 … 5.5 mm	IP40
VF MKCH22	Protective terminal cover with gasket for multipolar cables Ø 4 … 7.5 mm	IP65
VF MKCH23	Protective terminal cover with gasket for multipolar cables Ø 2 … 5.5 mm	IP65



Article	Description	Protection degree
VF C01	Protective terminal cover for screw terminals	IP20



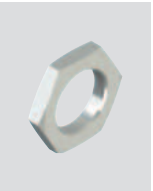
Article	Description	Protection degree
VF C02	Protective terminal cover for screw terminals with PG9 cable gland for multipolar cables Ø 5 … 7 mm	IP40

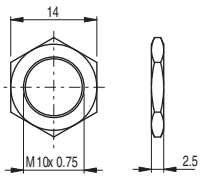


Article	Description	Protection degree
VF C03	Protective terminal cover for screw terminals, snap-in mounting. It allows installation of multiple switches side-by-side	IP20

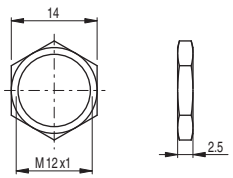
Accessories

Packs of **10 pcs.**

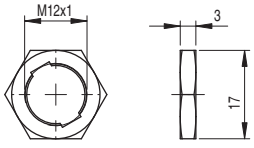




Article	Description
VF AC83	Hex threaded nut for microswitches with actuators D06, D08, D09



Article	Description
VF AC72	Hex threaded nut for microswitches with actuators D10, D12, D13



Article	Description
AC 35	Hex threaded nut, notched, for microswitches with actuators D15, D17

All values in the drawings are in mm

Accessories See page 195

➔ The 2D and 3D files are available at **www.pizzato.com**