FD series position switches for high temperatures

Main features
- Operating temperature up to +180°C
- Metal housing, one conduit entry
- Protection degree IP67

Quality marks:

EAC approval: RU C-IT.УТ03.B.00035/19

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20 x 1.5
Protection degree acc. to EN 60529:	IP67 with cable gland of equal or higher protection degree

General data

Ambient temperature:	-15°C … +180°C for FD 2011-M2T2 and FD 2016-M2T2 articles -25°C … +180°C for all other articles
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	1 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	2,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Fixing screws for the housing:	M5 with spring washer
Tightening torques for installation:	see page 229
Wire cross-sections and wire stripping lengths:	see page 249

In compliance with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, EN 50041, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, EN IEC 63000, UL 508, CSA C22.2 No. 14.

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.

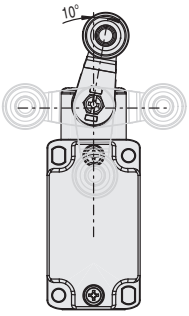
Installation for safety applications:
Use only switches marked with the ⊖ symbol beside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as required by **EN ISO 14119, paragraph 5.4** for specific interlock applications and **EN 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** shown in the travel diagrams on page 230. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 227 to 242.**

	Electrical data		Utilization category
Ambient temperature +20 °C	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Rated impulse withstand voltage (U_{imp}):	4 kV	Ie (A) 4 4 4
	Conditional short circuit current:	1000 A acc. to EN 60947-5-1	Direct current: DC13
	Protection against short circuits:	type gG fuse 4 A 250 V	Ue (V) 24 125 250
	Pollution degree:	3	Ie (A) 3 0.55 0.3
Ambient temperature +180 °C	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Protection against short circuits:	type gG fuse 4 A 250 V	Ie (A) 4 4 4
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24
			Ie (A) 1

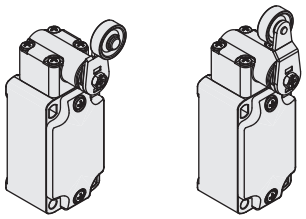
Adjustable levers

For switches with swivelling lever, the lever can be adjusted in 10° steps over the entire 360° range. The positive movement transmission is always guaranteed thanks to the particular geometrical coupling between the lever and the revolving shaft as prescribed for safety applications by the German standard BG-GS-ET-15.



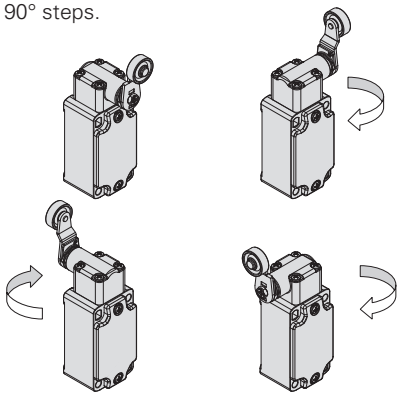
Reversible levers

For switches with swivelling lever, the lever can be fastened on straight or reverse side maintaining the positive coupling.
In this way two different working planes of the lever are possible.



Head with variable orientation

For all switches the head can be rotated in 90° steps.



Dimensional drawings

Contact type
L = slow action

Contact block

20 L	FD 2011-M2T2 1NO+2NC	FD 2016-M2T2 1NO+2NC	FD 2031-M2R24T2 1NO+2NC	FD 2032-M2T2 1NO+2NC
Max. speed	page 229 - type 4	page 229 - type 2	page 229 - type 1	1.5 m/s
Actuating force	8 N (25 N)	8 N (25 N)	0.1 Nm (0.25 Nm)	0.1 Nm
Travel diagrams	page 230 - group 1	page 230 - group 1	page 230 - group 4	page 230 - group 4

Contact type
L = slow action

Contact block

20 L	FD 2033-M2T2 1NO+2NC	FD 2056-M2R24T2 1NO+2NC	FD 2057-M2R24T2 1NO+2NC	Without actuator FD 2038-M2T2 1NO+2NC
Max. speed	1.5 m/s	page 229 - type 1	page 229 - type 1	/
Actuating force	0.1 Nm	0.1 Nm (0.25 Nm)	0.1 Nm (0.25 Nm)	0.1 Nm (0.25 Nm)
Travel diagrams	page 230 - group 4	page 230 - group 4	page 230 - group 4	page 230 - group 4

Special separate actuators for high temperatures

Steel roller with self-lubrication, Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Steel roller with self-lubrication, Ø 20 mm	Steel roller with self-lubrication, Ø 20 mm	Adjustable actuator with steel roller with self-lubrication, Ø 20 mm	Steel roller with self-lubrication, Ø 20 mm
VF L31-R24T2	VF L32-T2	VF L33-T2	VF L51-R24T2	VF L52-R24T2	VF L56-R24T2	VF L57-R24T2

Note: To order with 316L stainless steel roller: replace R24 with R41 in the order numbers.

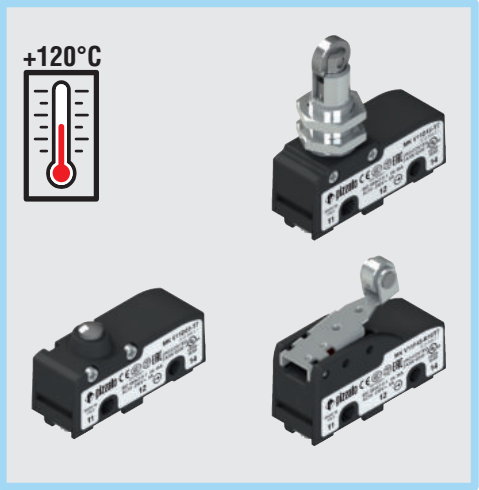
IMPORTANT: For safety applications: join only switches and actuators marked with symbol next to the product code.

All values in the drawings are in mm

Accessories See page 207

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

MK series microswitches for high temperatures



Main features

- Operating temperature up to +120°C
- Technopolymer housing
- High reliability contacts
- 4 terminal types available
- 15 actuators available
- Versions with positive opening ⊖
- Versions with gold-plated silver contacts

Quality marks:

IMQ approval: CA02.05772
UL approval: E131787
EAC approval: RU C-IT.УТ03.B.00035/19

Technical data

Housing
Housing made of glass fibre reinforced technopolymer, self-extinguishing and shock-proof.
Protection degree acc. to EN 60529: IP00 (terminals)
IP40 (electrical contacts)

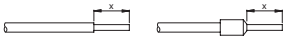
General data

Ambient temperature:	-25°C … +120°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	500,000 operating cycles
Safety parameter B_{10D}:	1,000,000 for NC contacts
Tightening torques for installation:	see page 190

Cable 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)

Cable 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, EN IEC 63000, IEC 60947-1.

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 the instructions given on pages 227 to 242.

Electrical data			Utilization category
Ambient temperature +20 °C	Thermal current (I_{th}):	16 A	Alternating current: AC15 (50 … 60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 120 250
	Rated impulse withstand voltage (U_{imp}):	4 kV	Ie (A) 3 5
	Conditional short circuit current:	1000 A acc. to EN 60947-5-1	Direct current: DC13
	Protection against short circuits:	type gG fuse 16 A 250 V	Ue (V) 24 125 250
	Pollution degree:	3	Ie (A) 4 0.6 0.3
	Dielectric strength	2000 Vac/min.	
Ambient temperature +120°C	Thermal current (I_{th}):	3 A	Alternating current: AC15 (50 … 60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 120 250
	Rated impulse withstand voltage (U_{imp}):	4 kV	Ie (A) 3 2
	Conditional short circuit current:	1000 A acc. to EN 60947-5-1	Direct current: DC13
	Protection against short circuits:	Fuse - 3 A or less 250 V type gG	Ue (V) 24 125
	Pollution degree:	3	Ie (A) 2 0.5
	Dielectric strength	2000 Vac/min.	

Features approved by IMQ

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

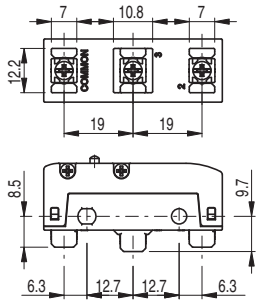
Forms of the contact element: C

In compliance with standards: EN 60947-1, EN 60947-5-1, fundamental requirements of the Low Voltage Directive 2014/35/EU.

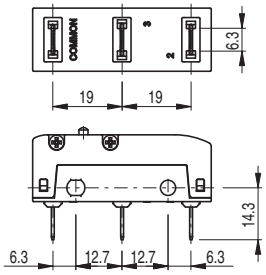
Please contact our technical department for the list of approved products.

Terminal dimensions

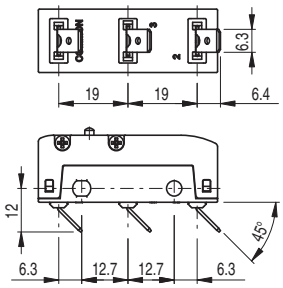
All values in the drawings are in mm



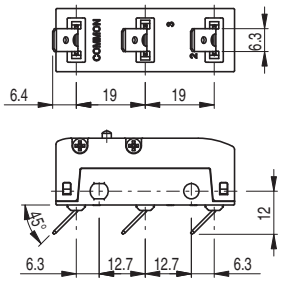
Screw terminals **V** with plate



Faston terminals **H**, vertical



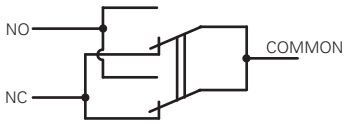
Faston terminals **F**, right angle



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

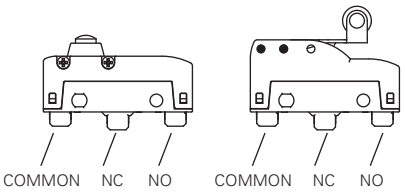
Note: The vertical faston terminals H can be bent according to specific installation requirements.
We recommend to bend the faston with an angle not higher than 45° and to carry out this operation no more than 5 times.

Circuit diagram

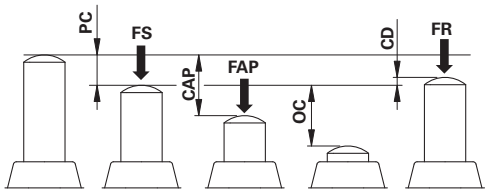


Mobile contact with single interruption and double contacts

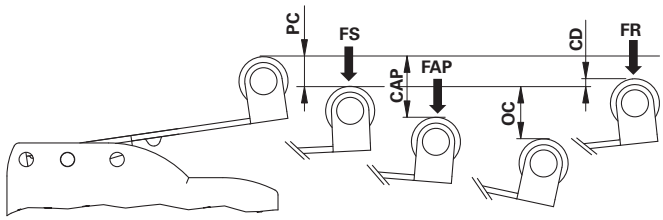
With direct actuation and direct actuation at the back (F, D)



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

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 V11F45-GR16T7

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

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

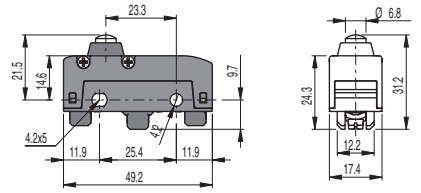
Actuator	
05	low plunger
06	threaded plunger
08	threaded plunger
...	...

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

Rollers	
R16	metal roller Ø 9.5x4 mm (for actuators 40, 42, 45, 59 only)

Ambient temperature	
T7	-25°C ... +120°C

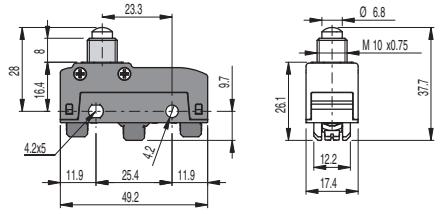
MK series microswitches for high temperatures



MK V11D05-T7 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		

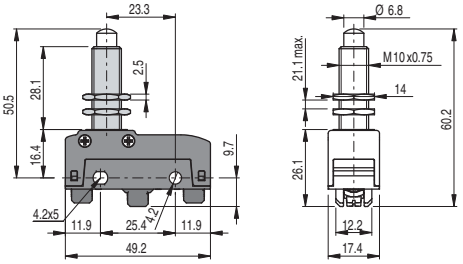
Maximum and minimum speed see page 239 - type 1



MK V11D06-T7 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		

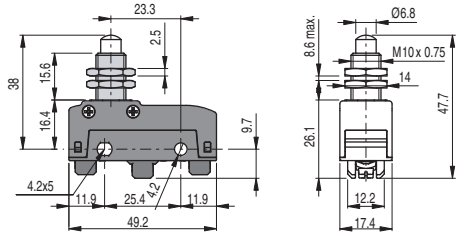
Maximum and minimum speed see page 239 - type 1



MK V11D08-T7 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		

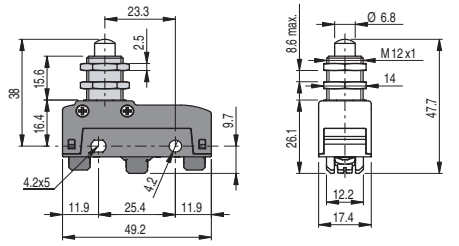
Maximum and minimum speed see page 239 - type 1



MK V11D09-T7 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		

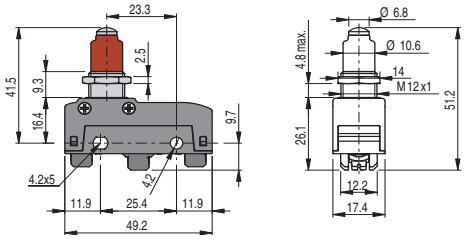
Maximum and minimum speed see page 239 - type 1



MK V11D10-T7 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 239 - type 1

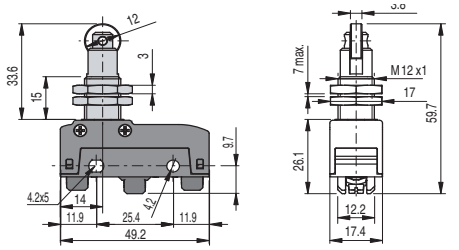


MK V11D12-T7 1NO+1NC

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 239 - type 1

Mounting only through threaded fitting

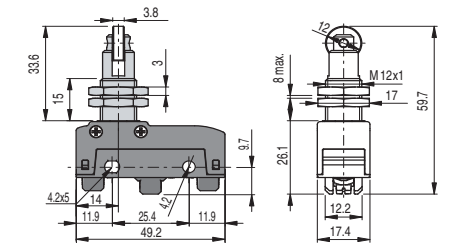


MK V11D15-T7 1NO+1NC

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 239 - type 2

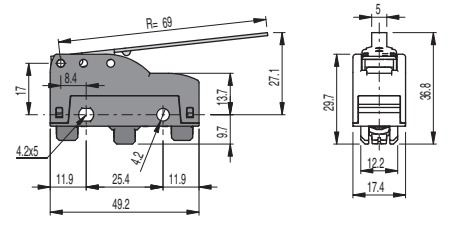
Mounting only through threaded fitting



MK V11D17-T7 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		

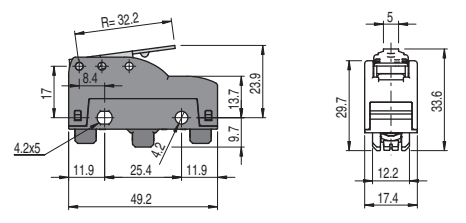
Maximum and minimum speed see page 239 - type 2



MK V11F30-T7 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 239 - type 5



MK V11F31-T7 1NO+1NC

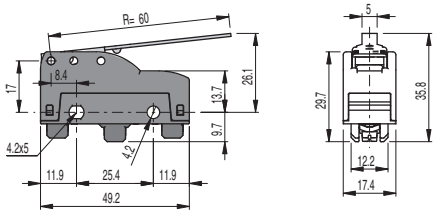
PC	1.45 mm	FS	1.5 N
OC	5 mm	FR	0.92 N
CD	0.17 mm	FAP	5.78 N
CAP	5.72 mm		

Maximum and minimum speed see page 239 - type 5

All values in the drawings are in mm

Accessories See page 207

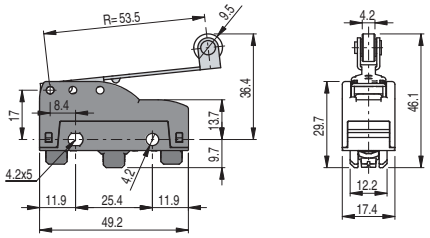
→ The 2D and 3D files are available at **www.pizzato.com**



MK V11F32-T7 1NO+1NC

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

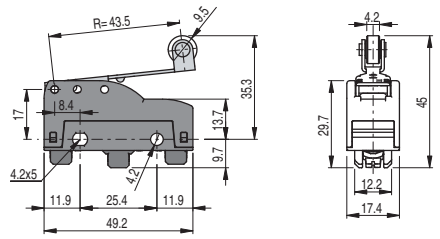
Maximum and minimum speed see page 239 - type 5



MK V11F40-R16T7 1NO+1NC

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

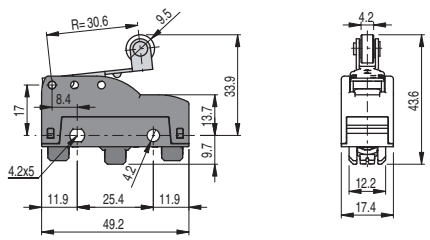
Maximum and minimum speed see page 239 - type 8



MK V11F42-R16T7 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	9 mm		

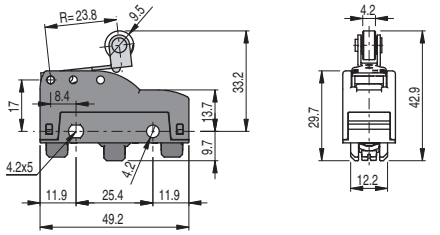
Maximum and minimum speed see page 239 - type 8



MK V11F45-R16T7 1NO+1NC

PC	1.1 mm	FS	1.3 N
OC	4.9 mm	FR	0.9 N
CD	0.1 mm	FAP	6.9 N
CAP	6.3 mm		

Maximum and minimum speed see page 239 - type 8



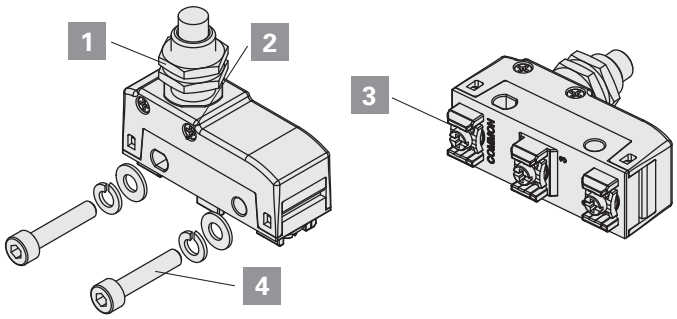
MK V11F59-R16T7 1NO+1NC

PC	0.8 mm	FS	1.7 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 239 - type 8

All values in the drawings are in mm

Tightening torques

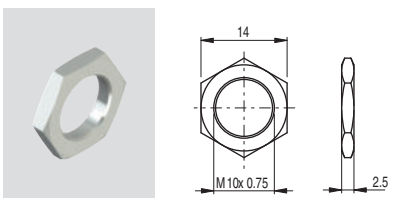


1	Head nuts	**2 ... 3 Nm**
2	Head screws	**0.3 ... 0.4 Nm**
3	Terminal screws	**0.6 ... 0.8 Nm**
4	M4 fixing screws, body (insert a washer and a spring washer)	**0.8 ... 1.2 Nm**

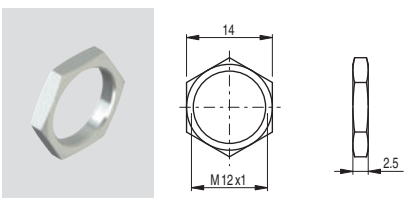
Attention: a tightening torque higher than 1.2 Nm can cause the breaking of the microswitch.

Accessories

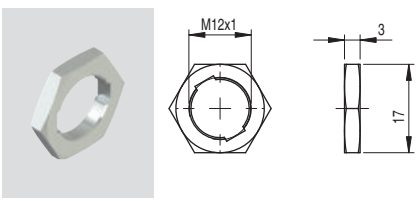
Packs of **10 pcs.**



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

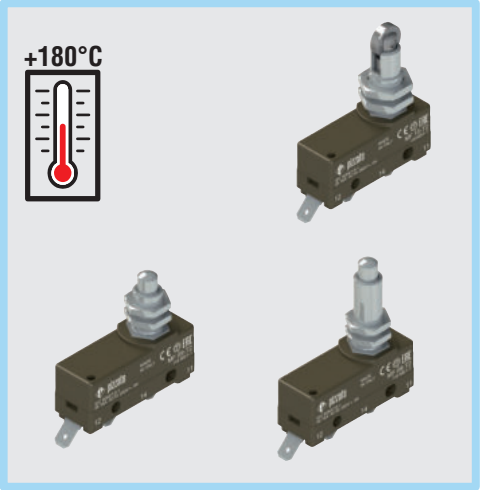


Article	Description
VF AC72	Hex threaded nut for micro-switches with actuators D10, D12, D13



Article	Description
AC 35	Hex threaded nut, notched, for microswitches with actuators D15, D16

MF series microswitches for high temperatures



Main features
- Operating temperature up to +180°C
- Technopolymer housing
- Protection degree IP20 or IP40
- 2 terminal types available
- 5 actuators available

Quality marks:

IMQ approval: CA02.05772
EAC approval: RU C-IT.УТ03.B.00035/19

Technical data

Housing
Housing made of glass fibre reinforced technopolymer, self-extinguishing and shock-proof.
Protection degree acc. to EN 60529: IP00 (terminals)
IP40 (electrical contacts)

General data

Ambient temperature:	-25°C … +180°C
Max. operating frequency:	3600 operating cycles/hour
Mechanical endurance:	1 million operating cycles
Tightening torques for installation:	see page 194

In compliance with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60528, EN 60529, EN IEC 63000.
Approvals:
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.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 227 to 242.**

Electrical data		Utilization category
Ambient temperature +20 °C		
Thermal current (I_{th}):	16 A	Alternating current: AC15 (50÷60 Hz)
Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 250
Rated impulse withstand voltage U_{imp}:	4 kV	Ie (A) 5
Conditional short circuit current:	1000 A acc. to EN 60947-5-1	Direct current: DC13
Protection against short circuits:	type gG fuse 16 A 250 V	Ue (V) 24 125 250
Pollution degree:	3	Ie (A) 5 0.5 0.3
Dielectric strength:	2000 V~ between terminals and other metal parts to ground.	
Ambient temperature +180 °C		
Thermal current (I_{th}):	12 A	Alternating current: AC15 (50÷60 Hz)
Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 250
Rated impulse withstand voltage U_{imp}:	4 kV	Ie (A) 5
Conditional short circuit current:	1000 A acc. to EN 60947-5-1	Direct current: DC13
Protection against short circuits:	type gG fuse 12 A 250 V	Ue (V) 24
Pollution degree:	3	Ie (A) 3
Dielectric strength:	2000 V~ between terminals and other metal parts to ground.	

Features approved by IMQ

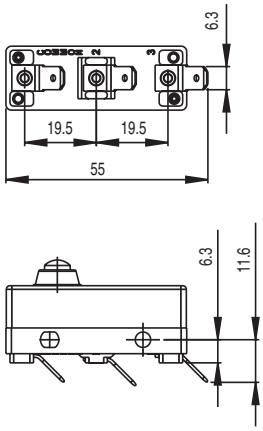
Rated insulation voltage (U_i):	250 Vac
Conventional free air thermal current (I_{th}):	12 A
Protection against short circuits:	type gG fuse 12 A 250 V
Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A
MF, MS terminals	
Pollution degree:	3
Utilization category:	AC15
Operating voltage (Ue):	250 Vac (50 Hz)
Operating current (Ie):	5 A

Forms of the contact element: C

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.

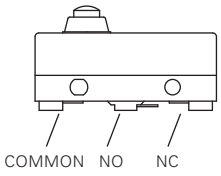
Terminal dimensions



All values in the drawings are in mm

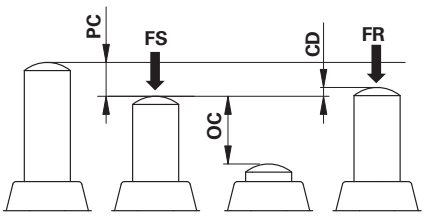
Circuit diagram

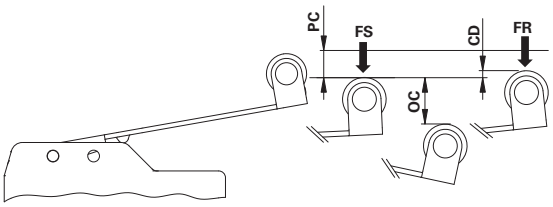
With direct actuation



Change-over contact element with single interruption and three terminals.

Actuation forces and travels





PC pre-travel
OC over-travel
CD differential travel
FS Trigger force
FR release force

Code structure

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

article

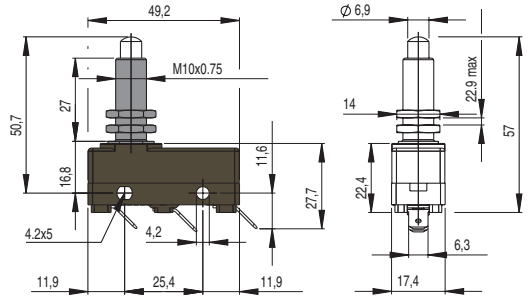
MF 08-T2

Terminal type	
MF	faston terminals

Ambient temperature	
T2	-25°C … +180°C

Actuator	
08	threaded plunger M10 x 0.75
09	threaded plunger M10 x 0.75
10	threaded plunger M12 x 1
15	threaded plunger with roller
17	threaded plunger with transversal roller

Microswitches with direct actuation

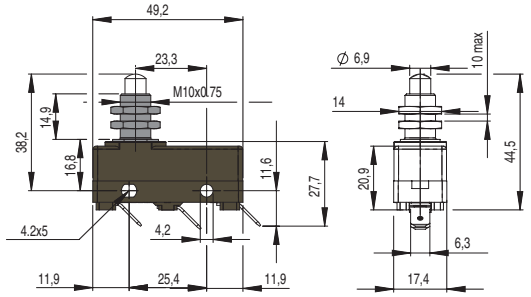


MF 08-T2

PC 0.5 mm
OC 5.5 mm
CD 0.05 mm

FS 3.9 N
FR 2.7 N

Maximum and minimum speed see page 240 - type 1

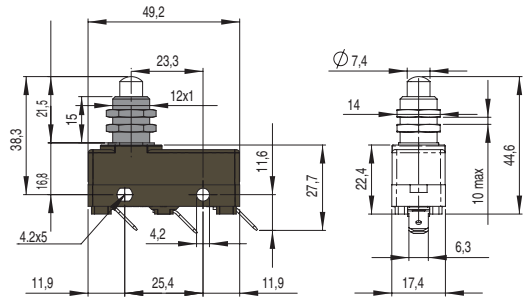


MF 09-T2

PC 0.5 mm
OC 5.5 mm
CD 0.05 mm

FS 3.9 N
FR 2.7 N

Maximum and minimum speed see page 240 - type 1

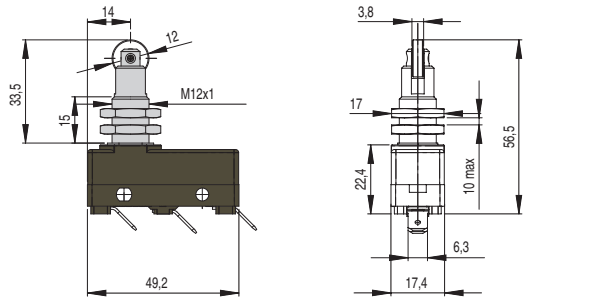


MF 10-T2

PC 0.5 mm
OC 5.5 mm
CD 0.05 mm

FS 3.9 N
FR 2.7 N

Maximum and minimum speed see page 240 - type 1



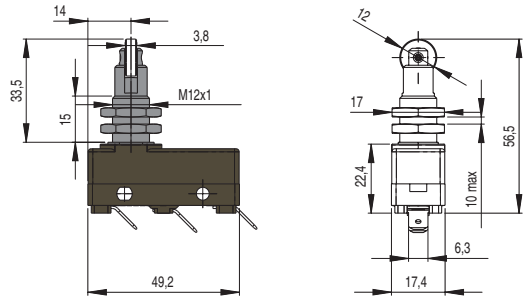
Secured only by means of threaded head

MF 15-T2

PC 0.5 mm
OC 5.5 mm
CD 0.05 mm

FS 3.9 N
FR 2.7 N

Maximum and minimum speed see page 240 - type 2



Secured only by means of threaded head

MF 17-T2

PC 0.5 mm
OC 5.5 mm
CD 0.05 mm

FS 3.9 N
FR 2.7 N

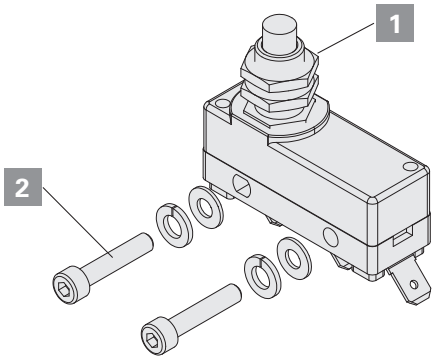
Maximum and minimum speed see page 240 - type 2

All values in the drawings are in mm

Accessories See page 207

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

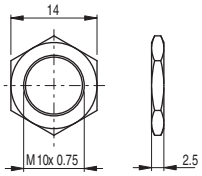
Tightening torques



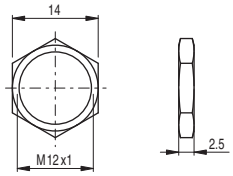
1 Head nuts **2 ... 3 Nm**
2 M4 fixing screws, body (insert a washer and a spring washer) **0.8 ... 1.2 Nm**
Attention: a tightening torque higher than 1.2 Nm can cause the breaking of the microswitch.

Accessories

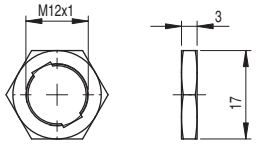
Packs of **10 pcs.**

Article	Description
VF AC83	Hex threaded nut for microswitches with actuators 08, 09

Article	Description
VF AC72	Hex threaded nut for micro-switches with actuator 10

Article	Description
AC 35	Hex threaded nut, notched, for microswitches with actuators 15, 17