Panasonic

GENERAL CATALOG

MAC-I LIMIT SWITCHES

Installation and maintenance

- Easy wiring
- Standardized installation
- Easy operation

Flexible output

- PC control
- Controls switching of low-level loads
- Flexible load control

The ideal limit switch

- Compact (reduced attachment space)
- Contact reliability (DC, low-level loads)
- Maintenance and safety guaranteed (with lamps and contact functions)
- Expanded detection functions (different kinds of actuators)
- Improved construction easy wiring and mounting (wiring and attachments)

Easy to use

- Improved machine accuracy (repeat detection accuracy improved)
- Responds to detected object (abundant variety of actuators)

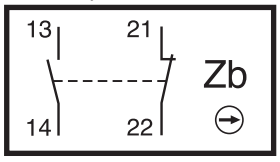
Reliability

- Stout (prevents external damage)
- Environment-resistant (dust-proof, drip-proof, oil-proof)
- Longevity (need for maintenance and parts replacement reduced)

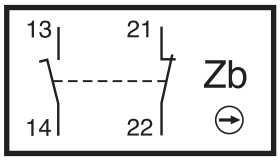
Table of contents

Overview	4
Technical information	5-7
Limit switches selector chart	8
MAP-T series limit switches	9-18
MAM-F/T series limit switches	19-26
MEP1G series limit switches	27-33
MEM1G series limit switches	34-40
Standards	41
Cross reference	42
Installation information	43-45
Further Panasonic products	47

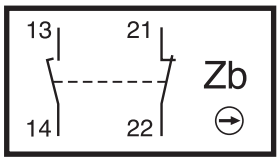
Z11: Snap action, 1 N.O. + 1 N.C.



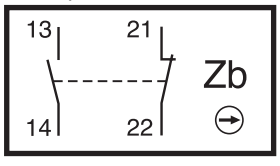
X11: Slow action, break before make, 1 N.O. + 1 N.C.



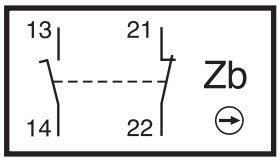
Y11: Slow action, make before break, 1 N.O.+1 N.C.



Z: Snap action, 1 N.O. + 1 N.C.



X: Slow action, break before make, 1 N.O. + 1 N.C.

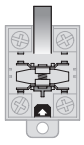
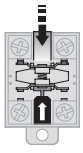
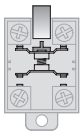


MAP series

MAM series

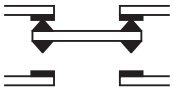
MEP1G series

MEM1G series

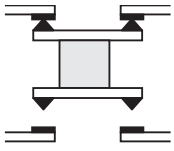
Technical information	Symbol	Description
Double insulation		Class II materials, according to IEC 536, are designed with double insulation. The functional insulation is doubled with an additional layer of insulation so as to eliminate the risk of electric shock and the need for protection elsewhere. It is not allowed to connect any conductive part of "double insulated" material to a protective conductor.
Positive opening operation		A control switch with one or more break-contact elements has a positive opening operation when the switch actuator ensures full contact opening of the break contact. For the part of travel that separates the contacts, there must be a positive drive with no resilient member (e.g. springs) between the moving contacts and the point of the actuator to which the actuating force is applied. The positive opening operation does not deal with N.O. contacts. Control switches with positive opening operation may be provided with either snap action or slow action contact elements. To use several contacts on the same control switch with positive opening operation, they must be electrically separated from each other, if not, only one may be used. Every control switch with positive opening operation must be indelibly marked on the outside with the symbol
Snap action	 State of rest  Contact change  Positive opening	Snap action contacts are characterized by a release position that is distinct from the operating position (differential travel). Snap breaking of moving contacts is independent of the switch actuator's speed and contributes to regular electric performance even for slow switch actuator speeds.
Slow action	 State of rest  Completely closed	Slow action contacts are characterized by a release position that is the same as the operating position. The switch actuator's speed directly conditions the travel speed of contacts.

Classification of the contact blocks according to the standard IEC 60947-5-1

Change-over contact elements with 4 terminals must be indelibly marked with the corresponding Za or Zb symbol as in the diagrams below.



Za Contacts with the same polarity



Zb The 2 moving contacts are electrically separated

Utilization category

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

Terminals

Limit switches with metal casings must have a terminal for a protective conductor that is placed inside the casing very close to the cable inlet and must be indelibly marked.

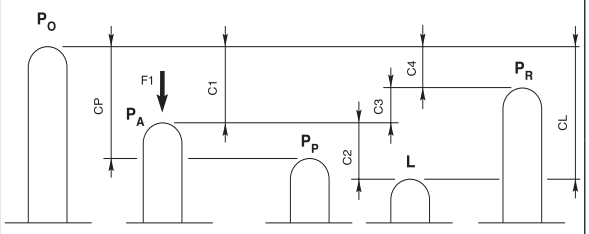
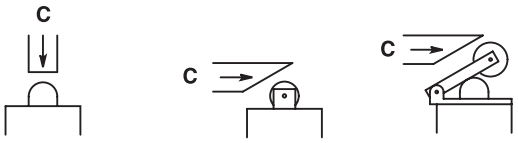
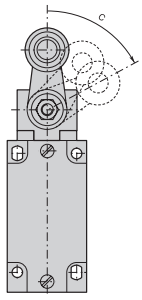
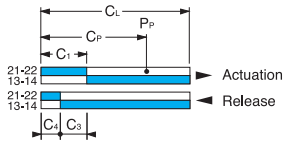
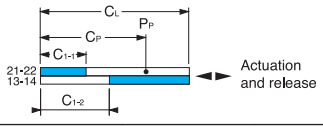
Minimum actuation force/torque

The minimum amount of force/torque that is to be applied to the switch actuator to produce a change in contact position.

Minimum force/torque to achieve positive opening operation

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

Travel and operation diagrams

Travel and operation	Classification	Term	Abbreviation	Definition
 Note: for slow action contacts, C3 = 0, C1-1 = pre-travel of contact 21-22, C1-2 = pre-travel of contact 13-14	Position	Free position	P_O	Position of the switch actuator when no external force is exerted on it.
		Operating position	P_A	Position of the switch actuator, under the effect of force F1, when the contacts leave their initial free position.
		Positive opening position	P_P	Position of the switch actuator from which positive opening is ensured.
		Max. travel position	L	Maximum acceptable travel position of the switch actuator under the effect of a force F1.
		Release position	P_R	Position of the switch actuator when the contacts return to their initial free position.
 Diagram in millimeters	Travel	Pre-travel	C_1	Distance between the free position P_O and the operating position P_A.
		Positive opening travel	C_P	Minimum travel of the switch actuator from the free position to ensure positive opening operation of the normally closed contact.
		Over-travel (O.T.)	C_2	Distance between the operating position P_A and the max. travel position L.
		Max. travel	C_L	Distance between the free position P_O and the max. travel position L
		Differential travel (C1-C4)	C_3	Travel difference of the switch actuator between the operating position P_A and the release position P_R
		Release travel	C_4	Distance between the release position P_R and the free position P_O
 Diagram in degrees				Diagram for snap action contacts
				Diagram for non-overlapping slow action contacts

Examples:

MAP1T12Z11
(snap action contacts)

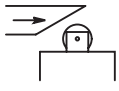
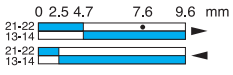


Diagram in millimeters/cam travel



MAP1T41Z11
(snap action contacts)

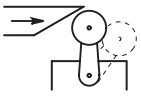
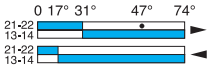


Diagram in degrees/lever rotation



MAP1T10X11
(non-overlapping slow action contacts)

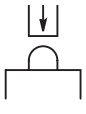
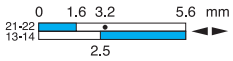
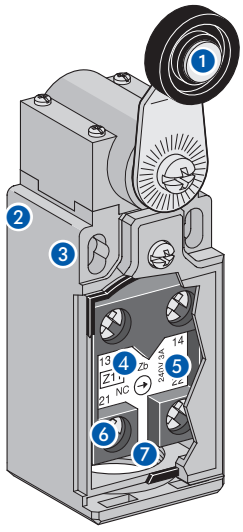


Diagram in millimeters/plunger travel





1. A variety of operating heads:
   - Plain plunger
   - Roller plunger
   - Roller lever, adjustable or not, etc.
     Assembled using 4 x ø 3 screws for 30
2. Casing
   - 30mm width with standardized dimensions acc. to EN 50047
3. Mounting the casing
   - 2 x M4 screws on top part for 30mm width
4. Contact Block:
   - Contact configuration: NO + NC
   - Positive opening operation
   - Snap action or slow action
   - Zb shape: the 2 contacts are electrically separated
5. Cover:
   - Closed using ø 3 screw for 30 and 50 mm width.
6. Connecting terminals:
   - Block of 2 contacts: M3.5 (+, –) pozidriv 2 screw
7. Electrical connection:
   - 1 x PG13.5 cable gland for AP series

1. A variety of operating heads:
   - Plain plunger
   - Roller plunger
   - Roller lever, adjustable or not, etc.
     Assembled using 2 x ø 3 screws (EP series)
     or 2 x M3 screws (EM series)
2. Casing
   - 30mm width casings
3. Mounting the casing
   - 2 x M4 screws on top part
4. Contact block
   - Contact configuration: 1 N.O. + 1 N.C.
   - Positive opening operation
   - Snap action or slow action
   - Zb shape: the 2 contacts are electrically separated
5. Electrical connection:
   - cable: PVC 4 x 0,75 mm² (EP...) / 5 x 0,75 mm² (EM...)
   - lenght: 1 m (different cables or lenghts)
   - optional: M12 connector
6. • Epoxy resin for IP67 protection degree

Glossary relating to the standard EN 60947-5-1

- **EN 60947-5-1**
  Identical with standard IEC 947-5-1
- **Categories of use**
  The following examples express the classification of switches by category of use.

Current type	Category	Contents
AC	AC-15	Controls electromagnetic loads in excess of 72VA (Volt Amperes)
DC	DC-13	Control of DC electromagnetics

- **Rated operational voltage (Ue)**
  The maximum rated voltage for switch operation. This must never exceed the maximum rated insulation voltage (Ui).
- **Rated operational current (Ie)**
  The maximum rated current for switch operation.
- **Rated insulation voltage (Ui)**
  The maximum rated current value which guards the switch's insulation functions, forming the parameters for the resistance values and the mounting distance.
- **Rated impulse withstand voltage (Uimp)**
  The peak impulse current value which enables the switch to resist without insulation breakdown.
- **Rated enclosed thermal current (Ithe)**
  The current value that enables current to flow without exceeding the specified maximum temperature in the recharging contact switch. If the pins are made of brass, the maximum temperature limit is 65°C
- **Conditional short circuit current**
  The current the switch can resist until the short circuit protection device is activated.
- **Short circuit protection device**
  A device that protects the switch from short circuits through a circuit break (breakers, fuses, etc.)
- **Switching overvoltage**
  The surge momentarily generated when a circuit is closed. Must be lower than the Uimp value.
- **Pollution degree**
  Expresses in levels the environment in which the switch is used. The four levels are shown below.
  Limit switches come under pollution degree 3.

Pollution degree	Contents
1	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
2	Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected.
3	Conducting contamination is generated or else dry non-conducting contamination is generated by circuits which can be anticipated.
4	Permanent conducting contamination is generated by dust, rain, snow, and other conductors.

Limit switch selector chart

Series	MAP-T series**	MAM-F/T series**	MEP1G series	MEM1G series
Product image				
Casing	Plastic casing, 30mm width, with standardized dimensions acc. to EN 50047	Metal casing, 30mm width, with standardized dimensions acc. to EN 50047	Plastic casing, 30mm width	Metal casing, 30mm width
Mounting	2 x M4 screws on top part for 30mm width		2 x M4 screws on top part	
Rated insulation voltage U_i	500V (pollution degree 3) (400V for contacts type X12P, X21P, W03P)		400V (pollution degree 3)	
Rated impulse withstand voltage U_{imp}	6kV		4kV	
Rated operational current I_e / AC-15 (according to IEC 947-5-1)	24V - 50/60Hz: 10A 120V - 50/60Hz: 6A 230V - 50/60Hz: 3.1A 240V - 50/60Hz: 3A 400V - 50/60Hz: 1.8A		24V - 50/60Hz: 5.0A 120V - 50/60Hz: 3.0A 240V - 50/60Hz: 1.5A	
Rated operational current I_e / DC-13 (according to IEC 947-5-1)	24V DC: 2.8A 125V DC: 0.55A 250V DC: 0.27A		24V DC: 1.1A 125V DC: 0.22A 250V DC: 0.1A	
Contact blocks	• Contact configuration: N.O. + N.C. • Positive opening operation • Snap action or slow action • Zb shape: the 2 contacts are electrically separated		• Contact configuration: 1 N.O. + 1 N.C. • Positive opening operation • Snap action or slow action • Zb shape: the 2 contacts are electrically separated	
Electrical connection	Cable inlets for PG13.5 cable gland*		Cable: PVC 4 x 0.75mm^2 Length: 1m*	Cable: PVC 5 x 0.75mm^2 Length: 1m*
Switching frequency	3600 cycles/h		3600 cycles/h	
Resistance between contacts	< 25mΩ		< 25mΩ	
Mechanical durability	>5 - 15 millions of operations (depending on actuator type, see page with details on each series)		10 millions of operations	
Standards	CUL$_{US}$, CE	UL, CE	CUL$_{US}$, CE (for details see page 40)	
Degree of protection	IP65	IP66	IP67	

* For other cable inlets and cable lengths, please contact your local sales office.

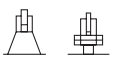
** For other contact blocks and electrical connections please contact your local sales office.

Actuators

Push plunger

Roller plunger

Cross-roller plunger



Roller arm

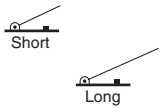
Adjustable roller arm

Adjustable rod

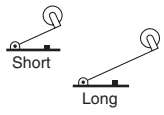
Spring wire

Flexible rod

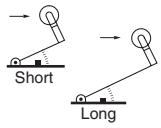
Hinge lever



Roller lever



One-way roller lever



Roller lever

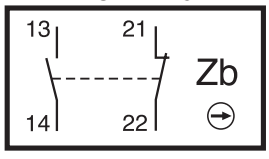
Ordering information

Example: M A P 1 T 41 Z 1 1

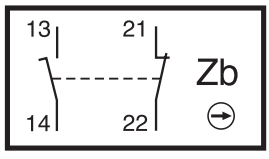
- Casing width: A = 30mm width + 1 cable inlet
- P: Plastic casing
- Electrical connection (other connections available)
- Plastic actuators
- Actuators
- Contact block
  - 11: 1 N.O. + 1 N.C. contacts
- Z: Zb Snap action
  X: Zb Slow action non-overlapping late make
  Y: Zb Slow action overlapping early make

Contacts blocks

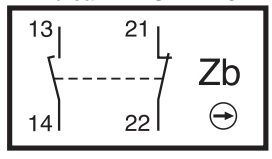
Z11: Snap action 1 N.O. + 1 N.C.



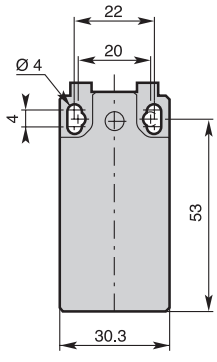
X11: Slow action break before make 1 N.O. + 1 N.C.

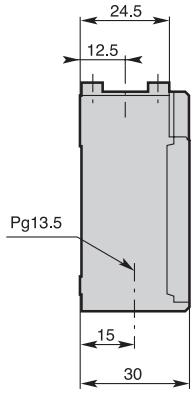


Y11: Slow action make before break 1 N.O.+1 N.C.

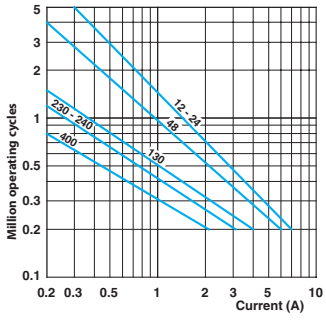


Dimensions (basic)

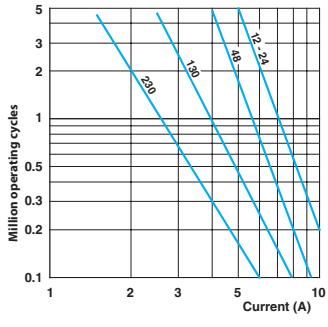




AC-15 - Snap action



AC-15 - Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24V	9.5W	12W
Voltage	48V	6.8W	9W
Voltage	110V	3.6W	6W

Features

- Double insulation
- 30mm width
- Casing made of polymeric
- Visible operation
- Able to switch strong currents (10A conventional thermal current)
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances
- Degree of protection: IP65

General technical data

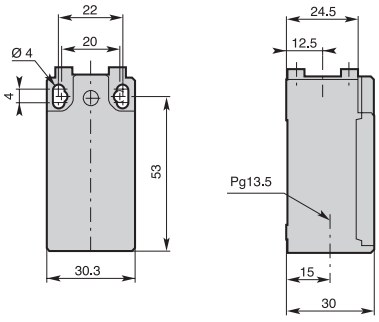
			Plastic casing
Standards			Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards
Certifications - Approvals			CUL_{US}
Ambient temperature – during operation – for storage			 -25 to +70°C -30 to +80!C
Climatic withstand			According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions			All positions are authorised
Shock withstand (acc. to IEC 68-2-27 and EN 60 068-2-27)			50g* (1/2 sinusoidal shock for 11ms) no change in contact position
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60 068-2-6)			25g (10 ... 500Hz) no change in position of contacts greater than 100 µs
Protection against electrical shocks (acc. to IEC 536)			Class II
Degree of protection (according to IEC 529 and EN 60 529)			IP65
Consistency (measured over 1 million operations)			0.1mm (upon closing point)
Minimum actuation speed		m/s	Slow action contacts 0.060 / Snap action contacts 0.001
Electrical Data			
Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14			 500V (pollution degree 3) A 600, Q 600
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	6
Conventional free-air thermal current I_{th} (according to IEC 947-5-1) w < 40 °C		A	10
Short-circuit protection U_e < 500V a.c. - gG (gl) type fuses		A	10
Rated operational current I_e / AC-15 (according to IEC 947-5-1)	 24V - 50/60Hz 120V - 50/60Hz 230V - 50/60Hz 240V - 50/60Hz 400V - 50/60Hz	 A A A A A	 10 6 3.1 3 1.8
I_e / DC-13 (according to IEC 947-5-1)	24V DC 125V DC 250V DC	A A A	2.8 0.55 0.27
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mΩ	<25
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp
Terminal for protective conductor			–
Connecting capacity		1 or 2 x mm^2	0.75 to 2.5
Terminal marking			According to EN 50 013
Mechanical durability		Millions of operations	15 10 >5 } MAP•T { 10...12; 30...34; 38 13; 41...48; 51...55; 61...75 14; 35; 36; 39; 91...93; 98
Electrical durability (according to IEC 947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves)

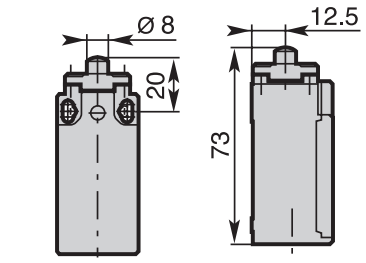
* except for MAP T42, T52, T5200, T55 and T5500: 25g.

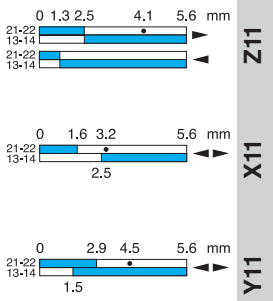
For the complete list of approved products, please contact our technical department.

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

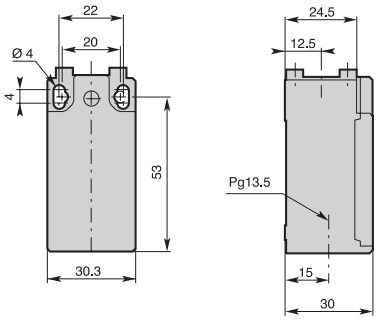
Plain plunger
MAP1T10•••*
T10: nylon plunger
T11: metal plunger

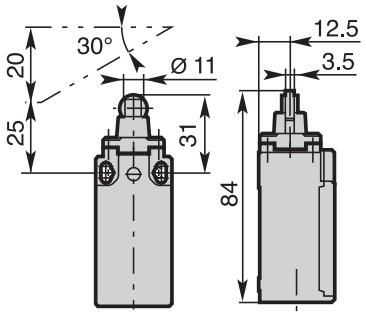


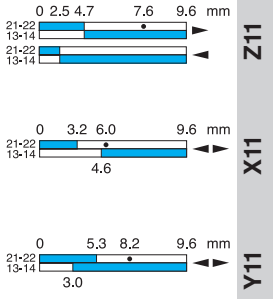




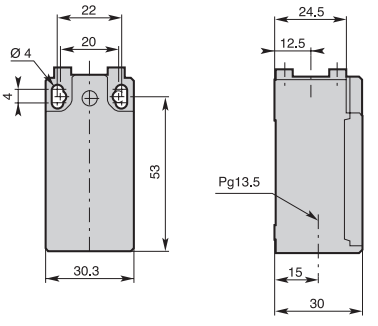
Roller plunger
MAP1T12•••*
T12: metal roller
T13: nylon roller

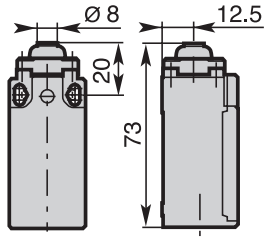


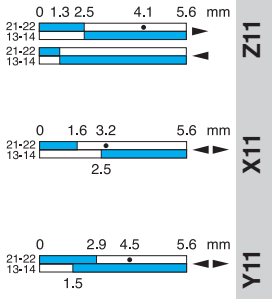




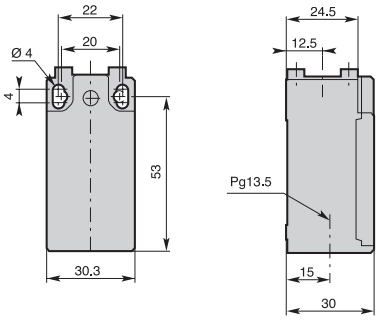
Metal plunger with dust protection cap
MAP1T14•••*

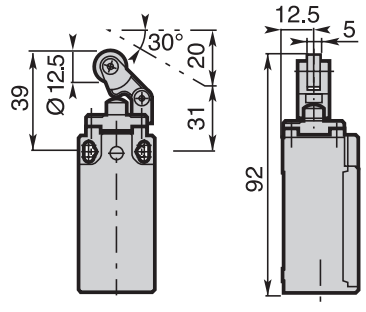


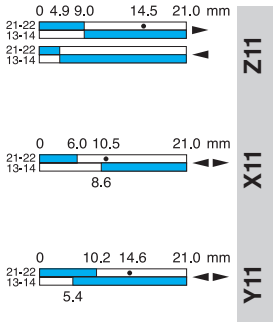




Plastic roller lever
MAP1T30•••*
T30: plastic plunger
T31: metal plunger



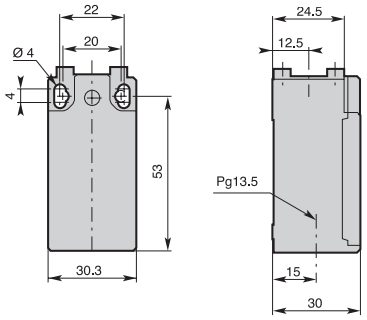


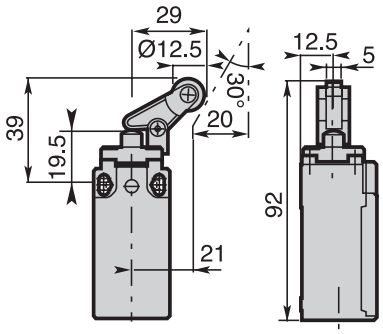


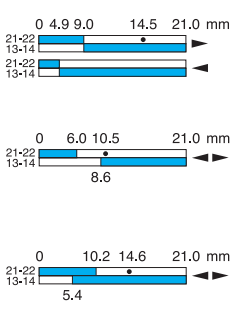
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

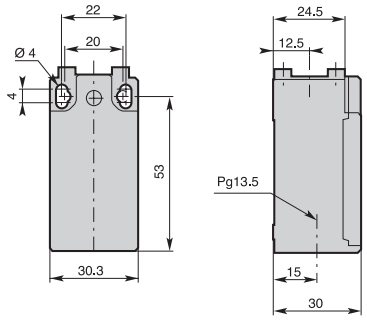
Plastic roller lever
MAP1T32•••*
T32: metal plunger
T34: plastic plunger

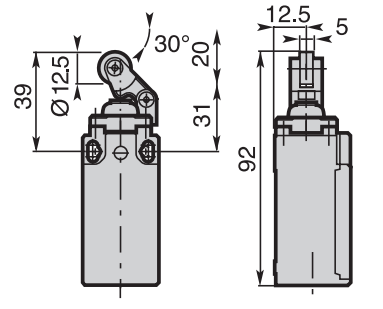


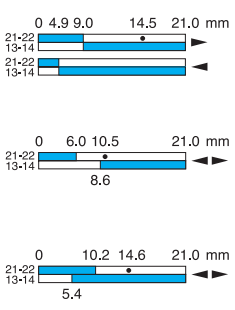




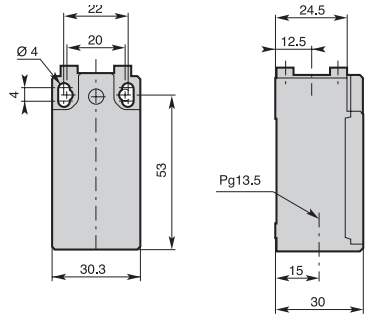
Plastic roller lever on metal plunger with dust protection cap
MAP1T35•••*

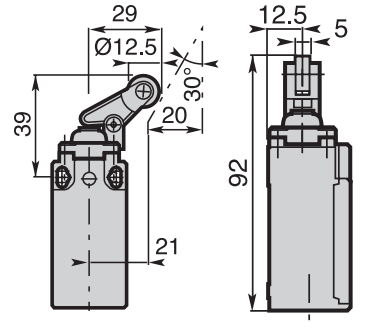


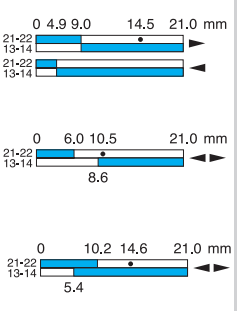




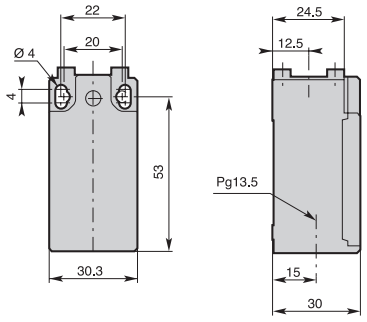
Plastic roller lever on metal plunger with dust protection cap
MAP1T36•••*

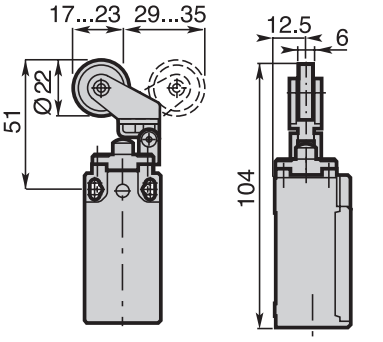


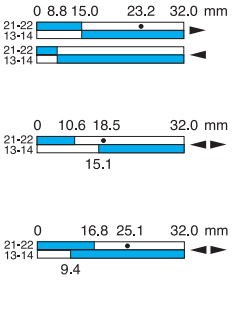




Adjustable plastic roller lever
MAP1T38•••*
T38 : on metal plunger
T39: on metal plunger with dust protection cap



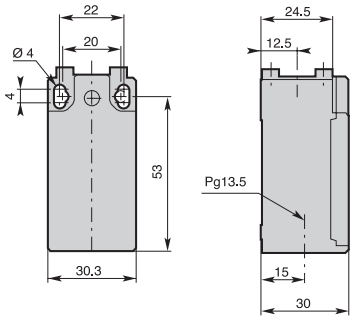


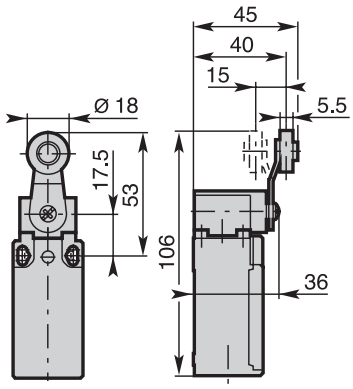


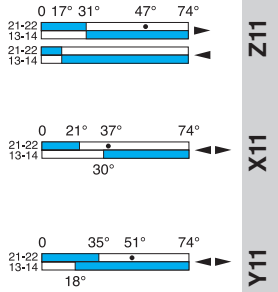
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

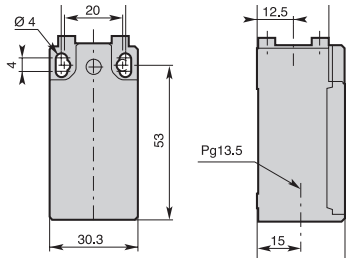
Roller lever
MAP1T41•••*
T41: nylon roller
T43: metal roller

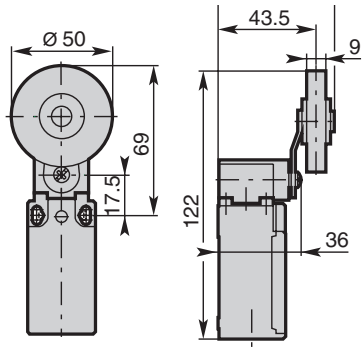


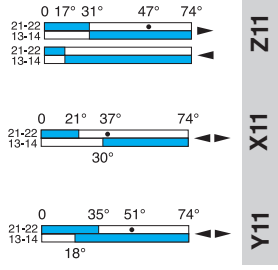




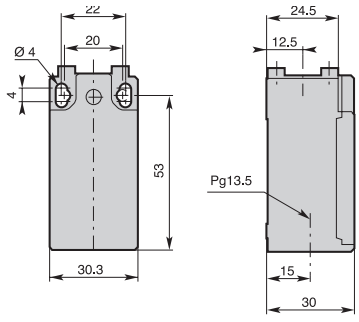
Rubber roller lever
MAP1T42•••*

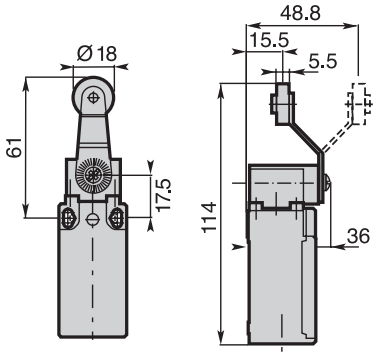


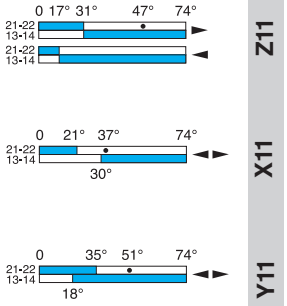




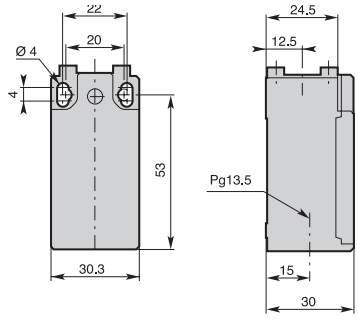
Roller lever
MAP1T45•••*
T45: nylon roller
T46: metal roller

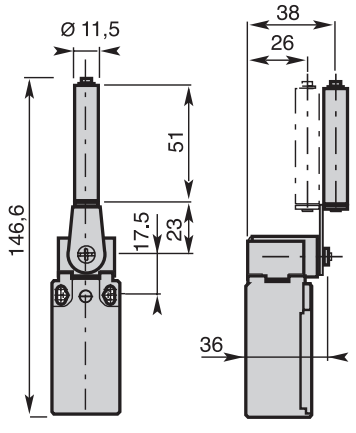


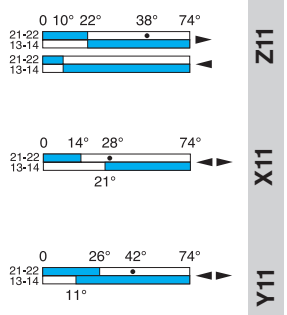




Ceramic rod lever
MAP1T48•••*



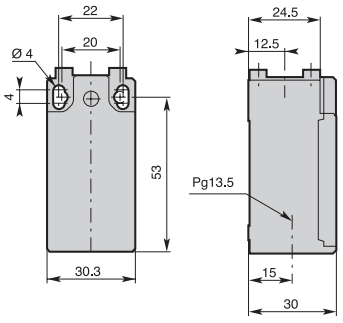


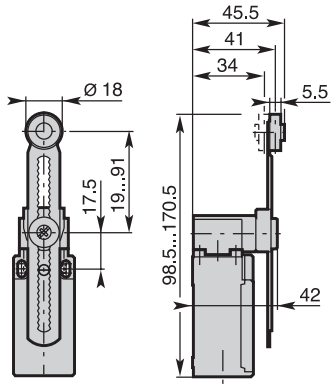


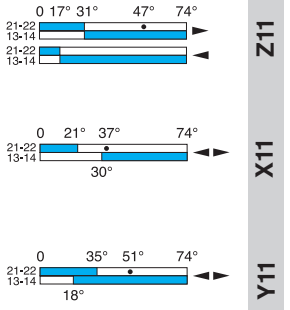
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

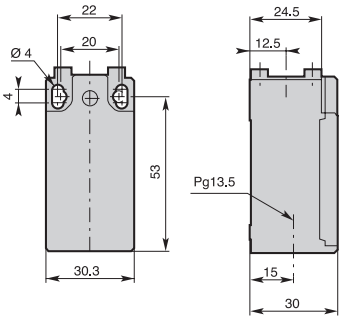
Adjustable toothed lever (step 2mm) with nylon roller
MAP1T5100•••*

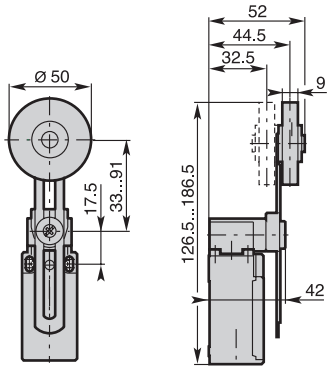


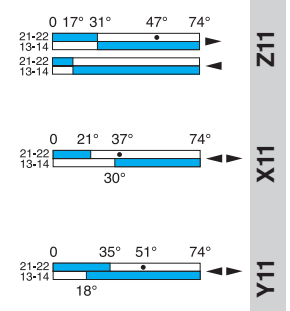




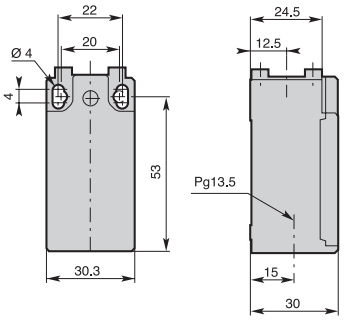
Adjustable lever with rubber roller
MAP1T52•••*

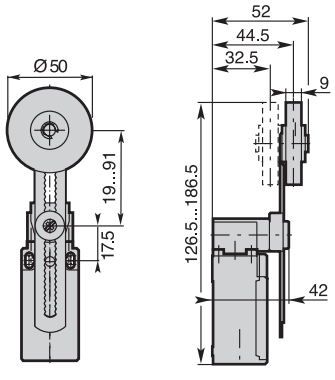


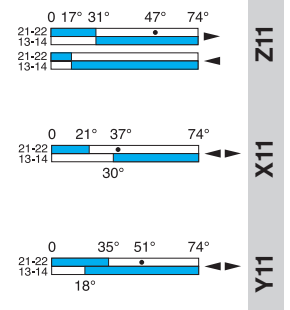




Adjustable toothed lever (step 2mm) with rubber roller
MAP1T5200•••*



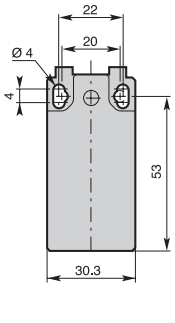


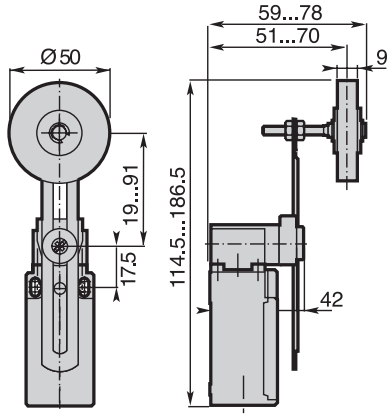


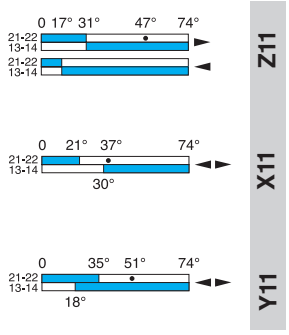
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

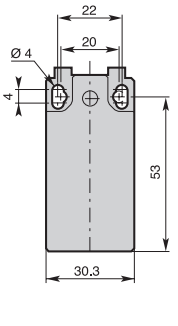
Adjustable lever with adjustable rubber roller
MAP1T55•••*

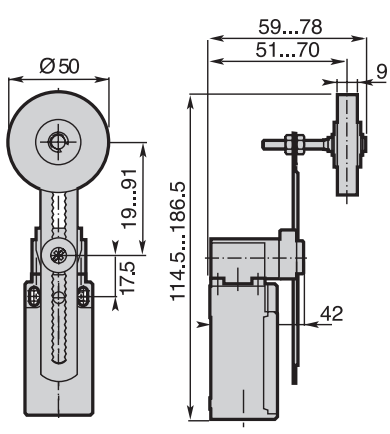


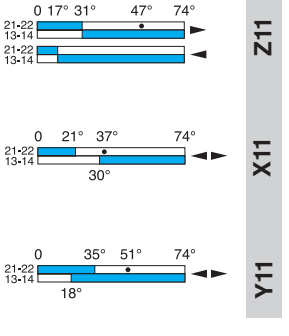




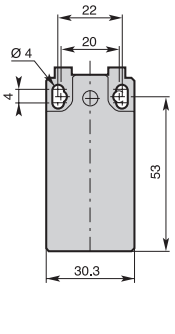
Adjustable toothed lever (step 2mm) with adjustable rubber roller
MAP1T5500•••*

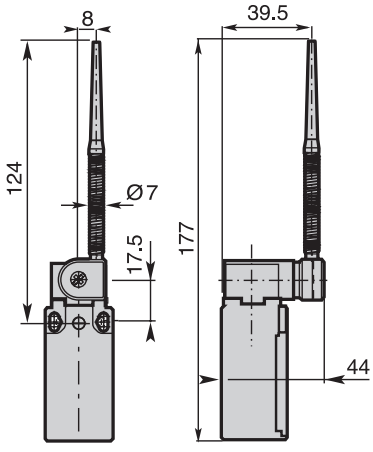


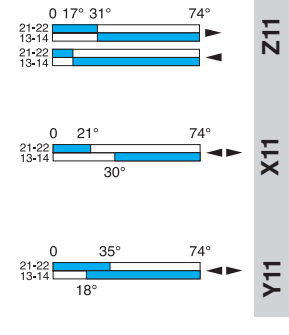




Nylon actuator with stainless steel spring
MAP1T61•••*



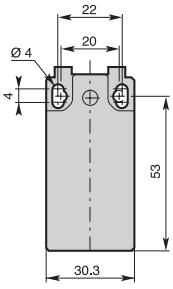


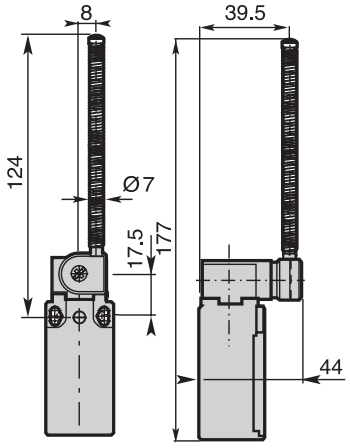


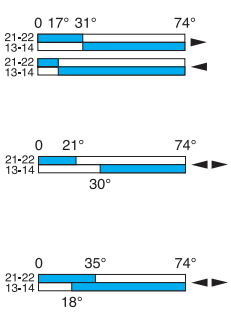
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

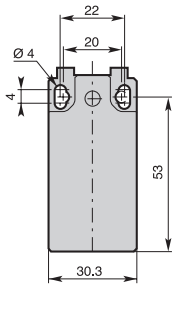
Stainless steel spring actuator
MAP1T62•••*

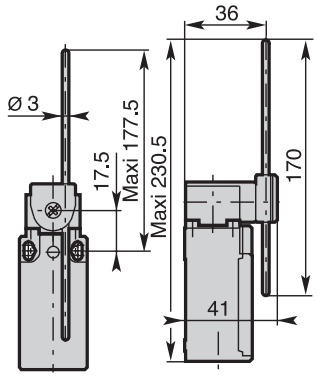


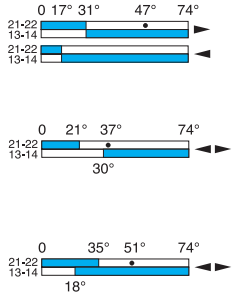




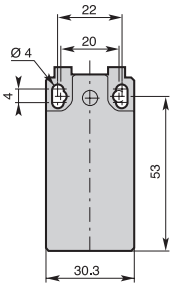
Adjustable rod lever
MAP1T71•••*
T71: stainless steel rod
T72: fiberglass rod

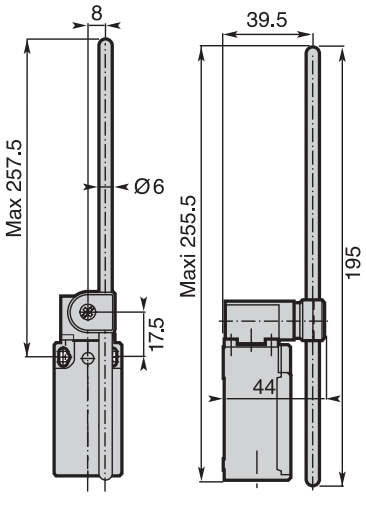


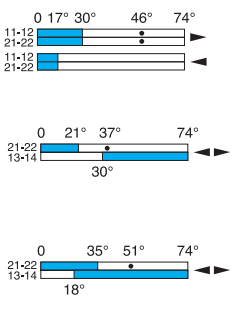




Adjustable rod lever
MAP1T73•••*
T73: nylon rod
T74: fiberglass rod



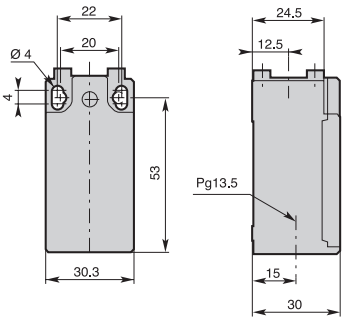


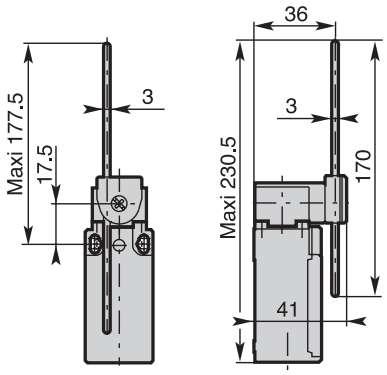


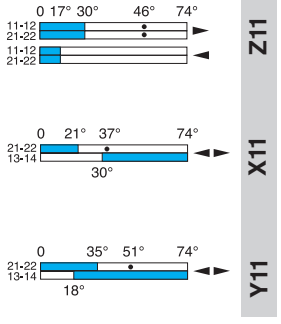
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

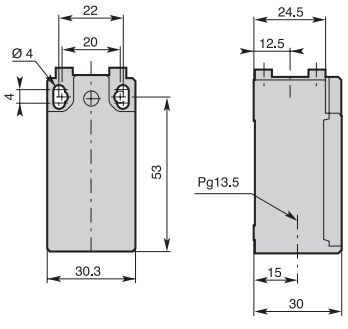
Adjustable square steel rod lever
MAP1T75•••*

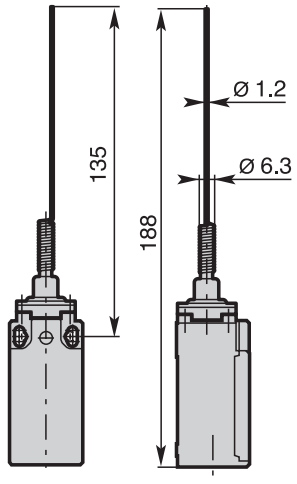


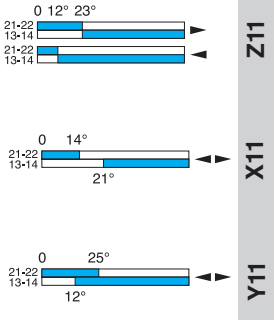




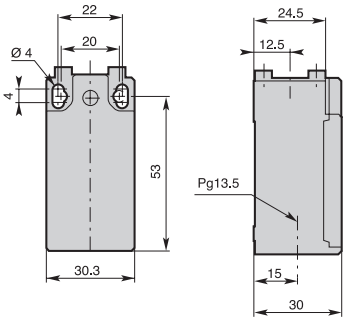
Stainless steel spring multidirectional actuator
MAP1T91•••*

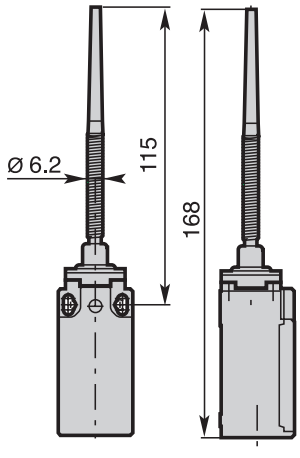


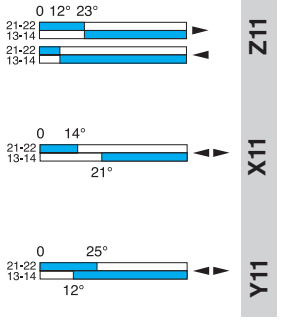




Multidirectional nylon actuator with stainless steel spring
MAP1T92•••*

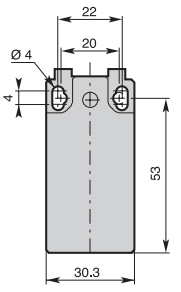


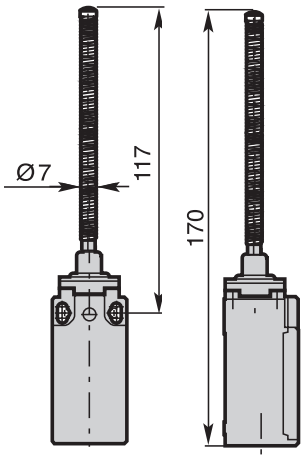


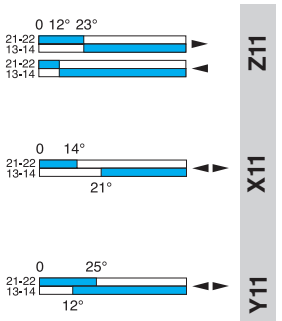


Product number | **Dimensions (basic)** | **Dimensions (head)** | **Operation diagram**

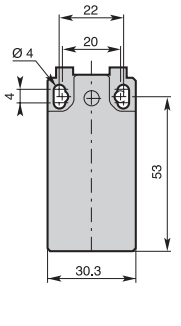
Stainless steel spring multidirectional actuator
MAP1T93•••*

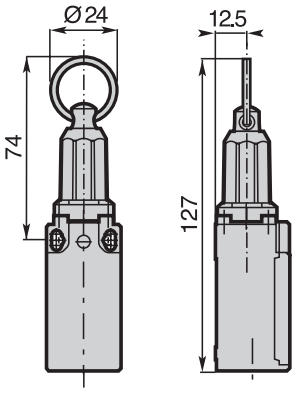


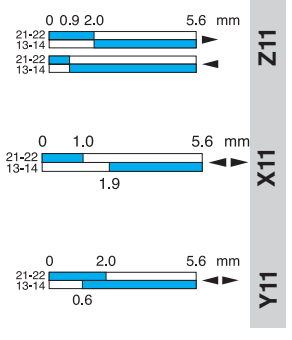




Pull action with ring
MAP1T98•••*







* Snap action: Z11, X11 or Y11

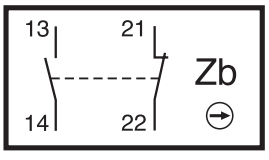
Ordering information

Example: M A M 1 T 41 Z 1 1

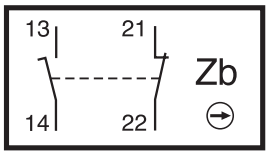
- Casing width: A = 30mm width + 1 cable inlet
- M: Metal casing
- Electrical connection (other connections available)
- Metal actuators
- Actuators:
- Contact block
  - 11: 1 NO + 1 NC contacts
- Z: Zb Snap action
  X: Zb Slow action non-overlapping late make
  Y: Zb Slow action overlapping early make

Contact blocks

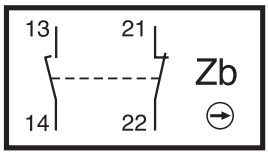
Z11: Snap action 1 N.O. + 1 N.C.



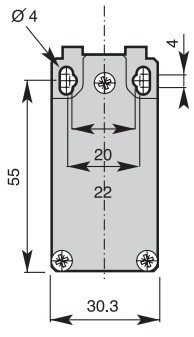
X11: Slow action break before make 1 N.O. + 1 N.C.

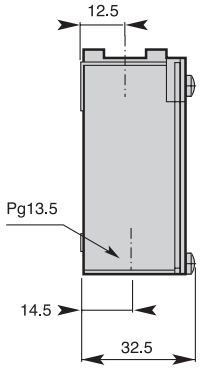


Y11: Slow action make before break 1 N.O.+1 N.C.

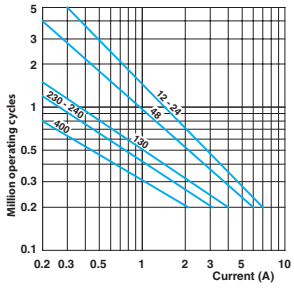


Dimensions (basic)

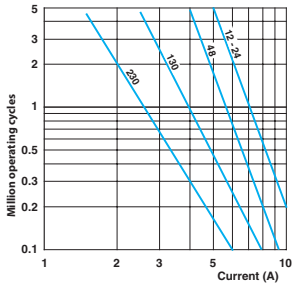




AC-15 - Snap action



AC-15 - Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24V	9.5W	12W
Voltage	48V	6.8W	9W
Voltage	110V	3.6W	6W

Features

- Double insulation
- 30mm width
- Metal casing
- Visible operation
- Able to switch strong currents (10A conventional thermal current)
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances
- Degree of protection: IP66

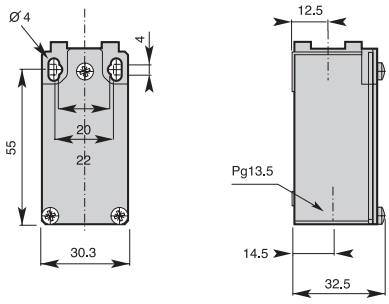
General technical data

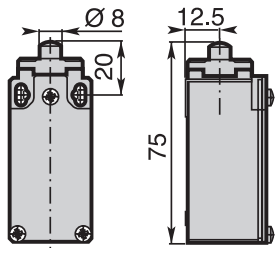
			Metal casing
Standards			Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards
Certifications - Approvals			CUL_{US}
Ambient temperature			
– during operation		°C	– 25 ... + 70
– for storage		°C	– 30 ... + 80
Climatic withstand			According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions			All positions are authorised
Shock withstand (according to IEC 68-2-27 and EN 60 068-2-27)			50g* (1/2 sinusoidal shock for 11ms) no change in contact position
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60 068-2-6)			25g (10 ... 500Hz) no change in position of contacts greater than 100 µs
Protection against electrical shocks (acc. to IEC 536)			Class I
Degree of protection (according to IEC 529 and EN 60 529)			IP66**
Consistency (measured over 1 million operations)			0.05mm (upon closing point)
Minimum actuation speed		m/s	Slow action contacts 0.060 / Snap action contacts 0.001
Electrical Data			
Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14			500V (pollution degree 3) A 300, Q 300
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	6
Conventional free-air thermal current I_{th} (according to IEC 947-5-1) σ < 40 °C		A	10
Short-circuit protection U_e < 500V a.c. - gG (gl) type fuses		A	10
Rated operational current			
I_e / AC-15 (according to IEC 947-5-1)	24V - 50/60Hz	A	10
	120V - 50/60Hz	A	6
	230V - 50/60Hz	A	3.1
	240V - 50/60Hz	A	3
	400V - 50/60Hz	A	1.8
I_e / DC-13 (according to IEC 947-5-1)	24V DC	A	2.8
	125V DC	A	0.55
	250V DC	A	0.27
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mΩ	<25
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp
Terminal for protective conductor			M3.5 (+, –) pozidriv 2 screw with cable clamp
Connecting capacity According to EN 50 013		1 or 2 x mm^2	0.75 ... 2.5
Mechanical durability		Millions of operations	15 } MAM•T { 10...12; 30...34; 38 10 } { 13; 41...48; 51...75 >5 } { 14; 35; 36; 39; 98
Electrical durability (according to IEC 947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves)

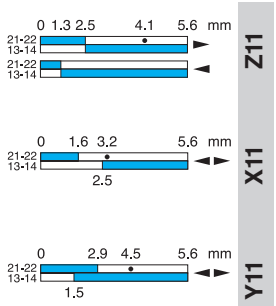
* except for MAM•F42, F52, F55: ** except for MAM•F52, F55, F73, F74 and the degree of protection is IP65.
For the complete list of approved products, please contact our technical department.

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

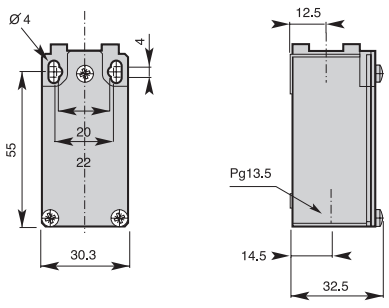
Plain plunger
MAM1F11•••*

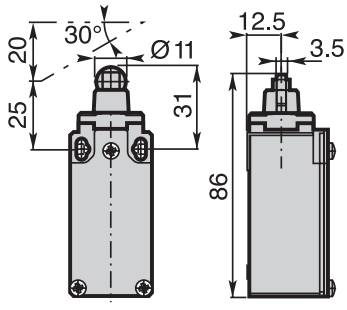


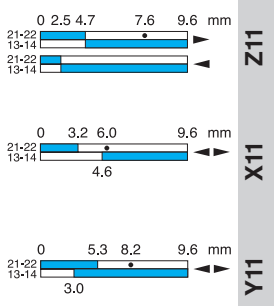




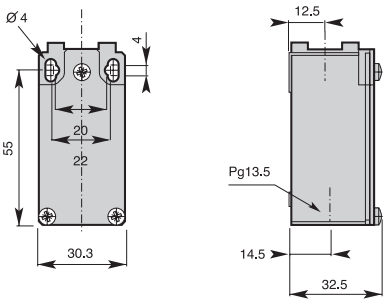
Metal roller plunger
MAM1F12•••*

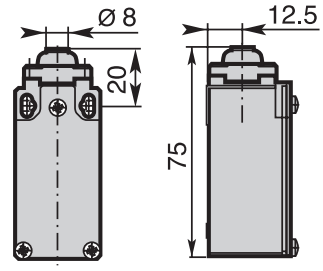


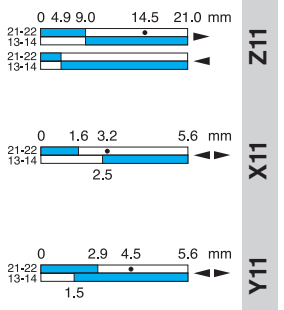




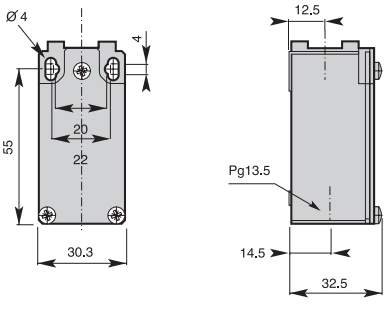
Metal plunger with dust protection cap
MAM1T14•••*

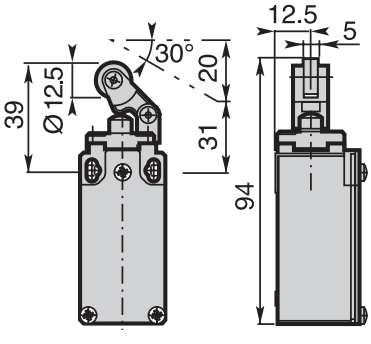


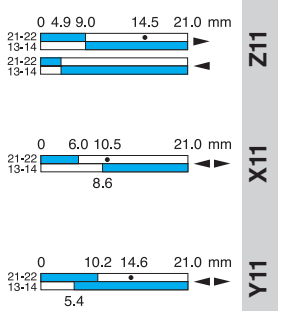




Plastic roller lever
MAM1T30•••*
T30: on plastic plunger
T31: on metal plunger



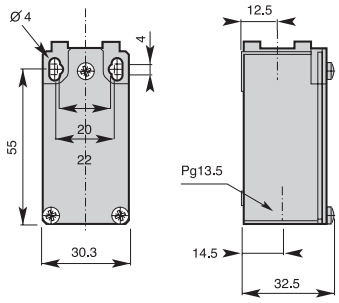


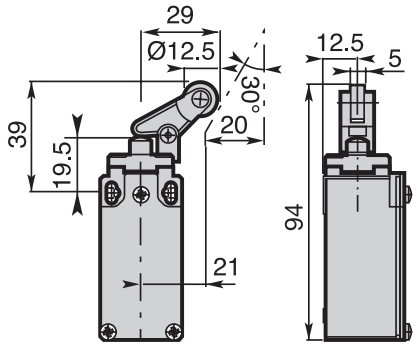


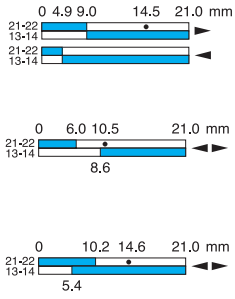
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

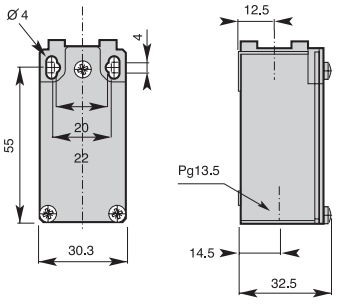
Plastic roller lever
MAM1T32•••*
T32: on metal plunger
T34: on plastic plunger

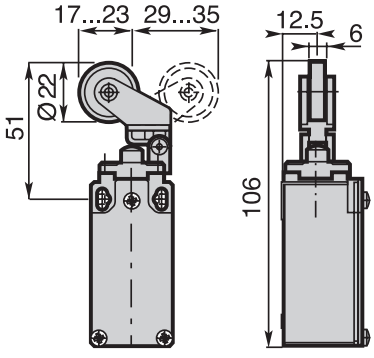


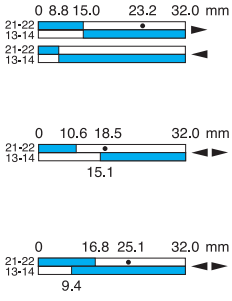




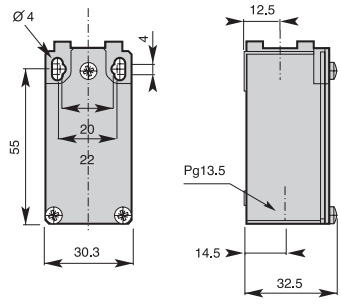
Adjustable plastic roller lever
MAM1T38•••*
T38: on metal plunger
T39: on metal plunger with dust protection cap

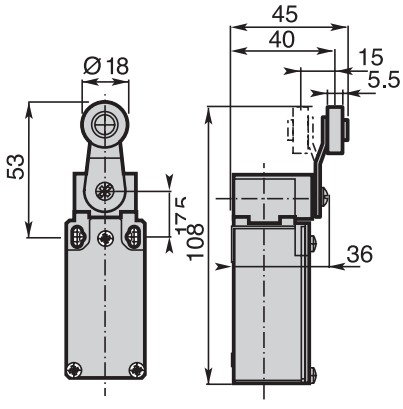


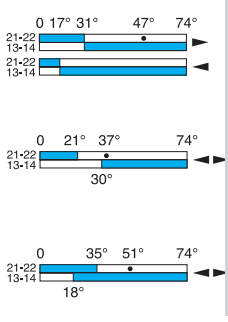




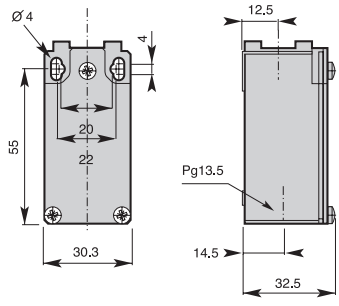
Roller lever
MAM1F41•••*
F41: nylon roller
F43: metal roller

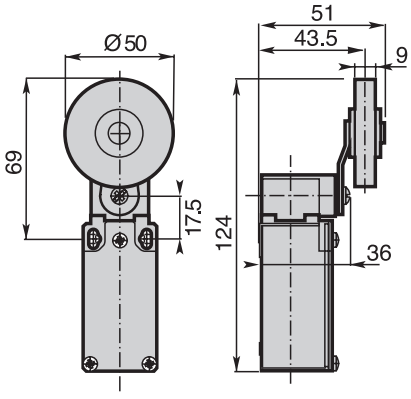


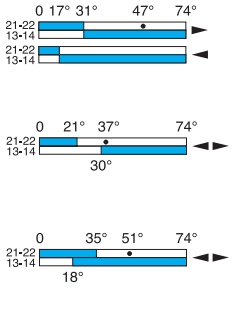




Rubber roller lever
MAM1F42•••*



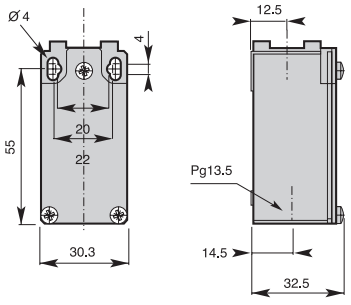


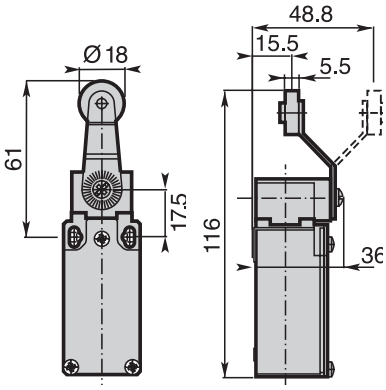


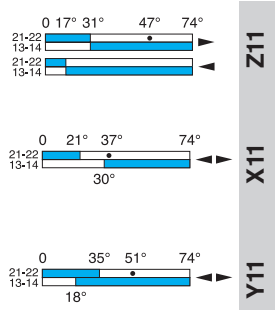
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

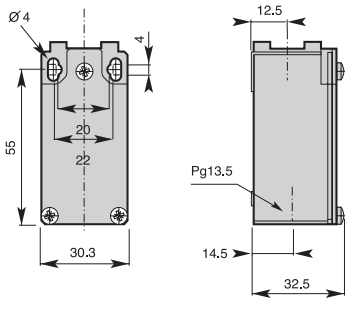
Plastic roller lever
MAM1F45•••*
F45: nylon roller
F46: metal roller

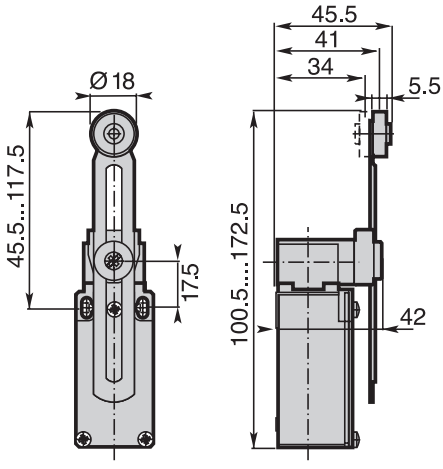


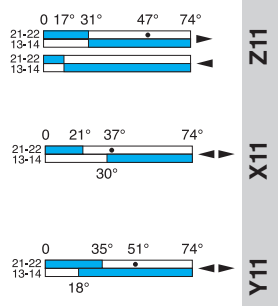




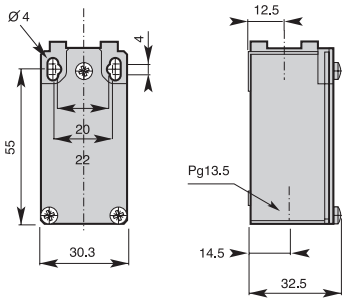
Adjustable lever with roller
MAM1F51•••*
F51: nylon roller
F53: metal roller

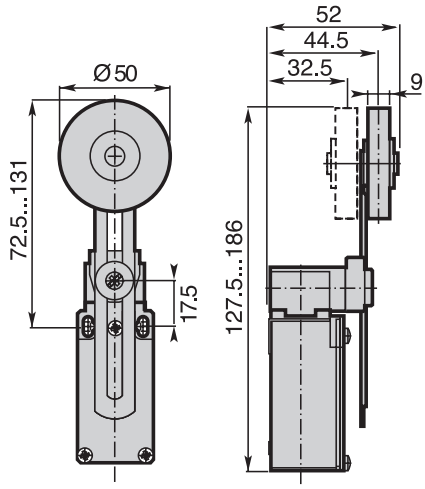


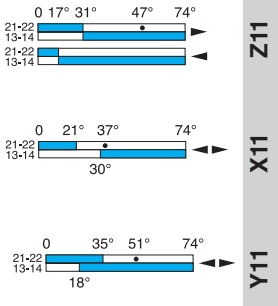




Adjustable rubber roller lever
MAM1F52•••*



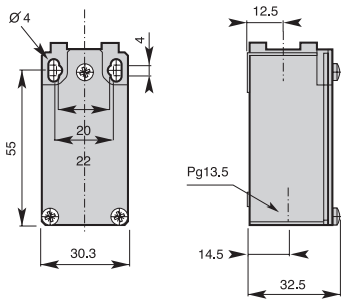


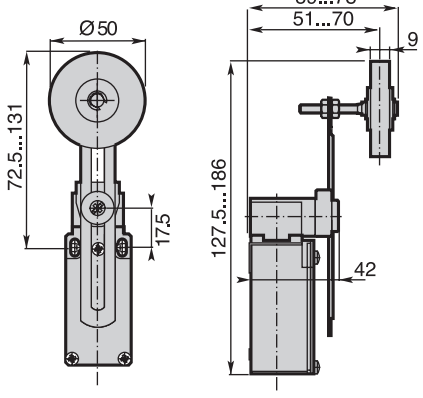


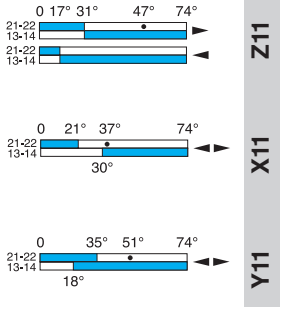
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

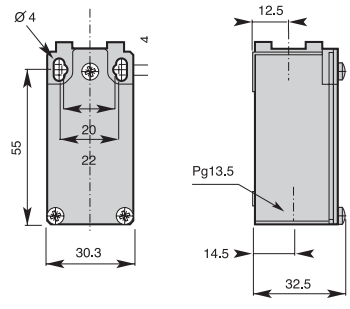
Adjustable lever with adjustable rubber roller
MAM1F55•••*

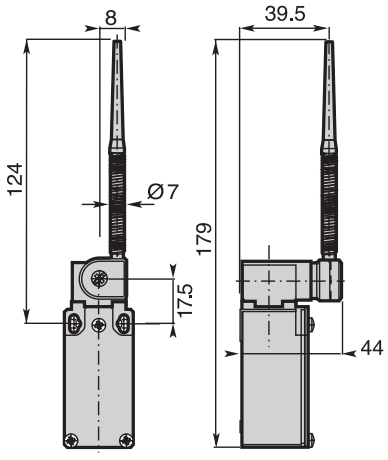


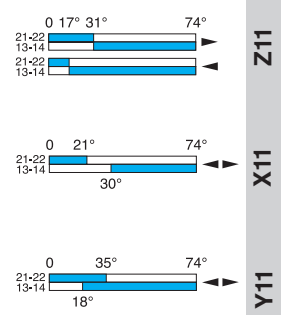




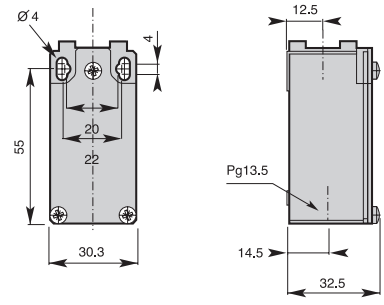
Nylon actuator with stainless steel spring
MAM1F61•••*

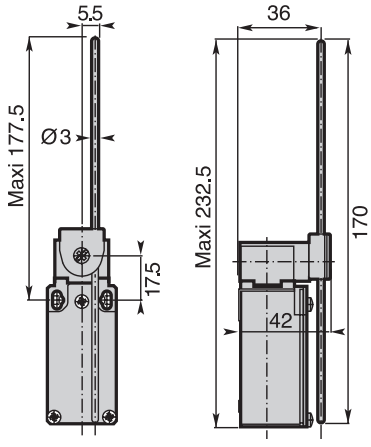


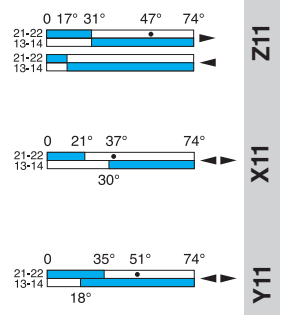




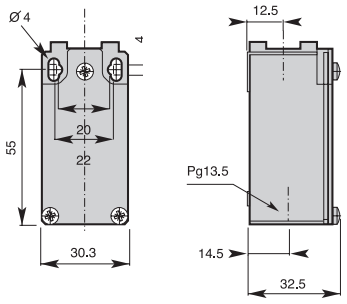
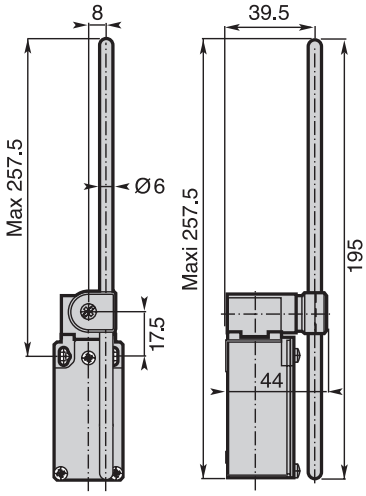
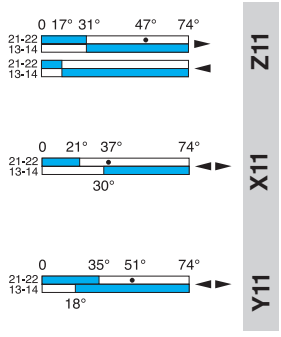
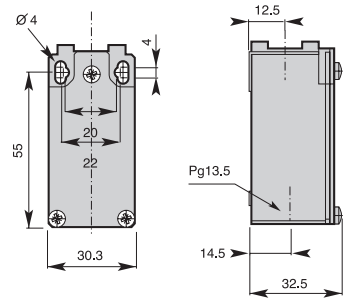
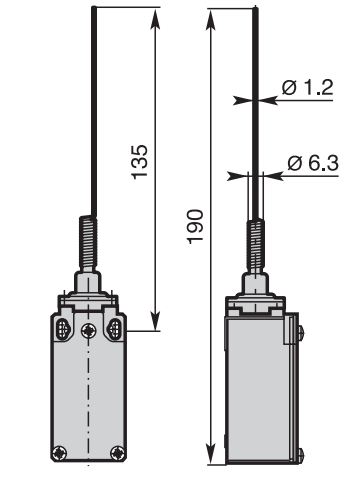
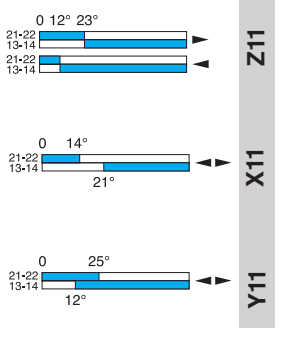
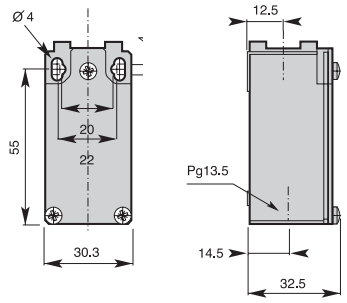
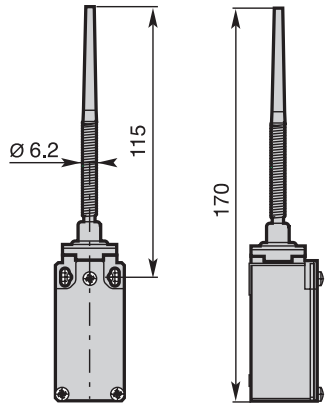
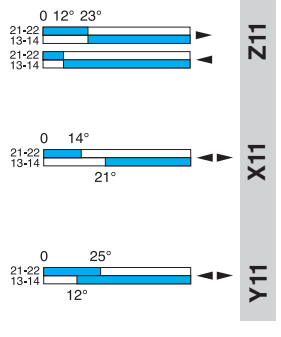
Adjustable rod lever
MAM1F71•••*
F71: stainless steel rod
F72: fiberglass rod
F75: square steel rod







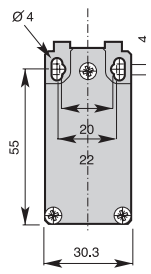
* Snap action: Z11, X11 or Y11

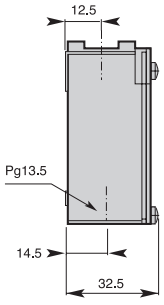
Product number	Dimensions (basic)	Dimensions (head)	Operation diagram
Adjustable rod lever MAM1F73•••* F73: nylon rod F74: fiberglass rod			
Stainless steel spring multidirectional actuator MAM1T91•••*			
Multidirectional nylon actuator with stainless steel spring MAM1T92•••*			

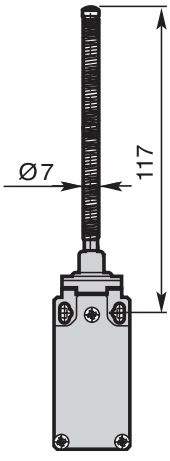
* Snap action: Z11, X11 or Y11

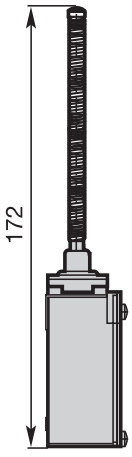
Product number | **Dimensions (basic)** | **Dimensions (head)** | **Operation diagram**

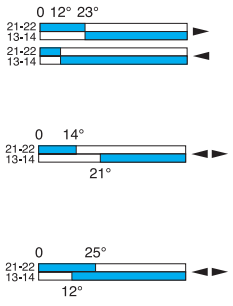
Stainless steel spring multidirectional actuator
MAM1T93•••*



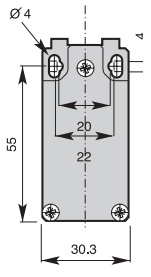


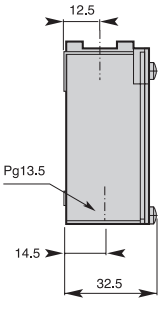


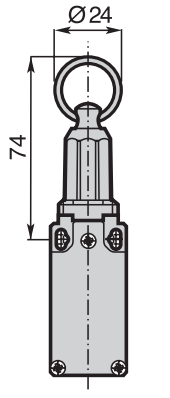


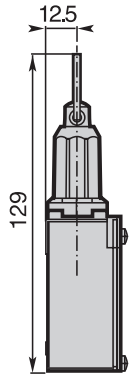


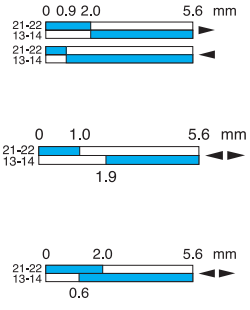
Pull action with ring
MAM1T98•••*











* Snap action: Z11, X11 or Y11

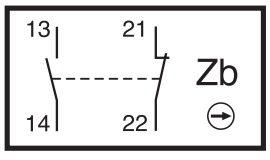
Ordering information

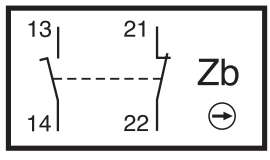
Example: M | EP1 | G12 | Z

- EP1: Casing: EP1 = plastic casing 30mm width
- G12: Actuators: codes G11 - G9999
- Z: Contact block
  - Z: Zb Snap action 1 N.O. + 1 N.C.
  - X: Zb Slow action non-overlapping late make 1 N.O. + 1 N.C.

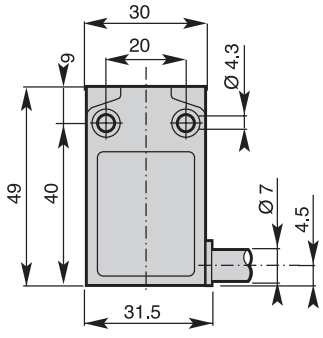
Contacts

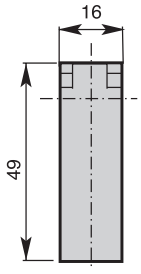
Z: Snap action 1 N.O. + 1 N.C. **X:** Slow action break before make 1 N.O. + 1 N.C.





Dimensions (basic)





Features

- Double insulation
- 30mm width
- Casing made of plastic
- Visible operation.
- Able to switch strong currents (10A conventional thermal current).
- Electrically separated contacts.
- Precise operating points (consistency).
- Immune to electromagnetic disturbances.
- Degree of protection: IP67
- Standard cable length 1m*

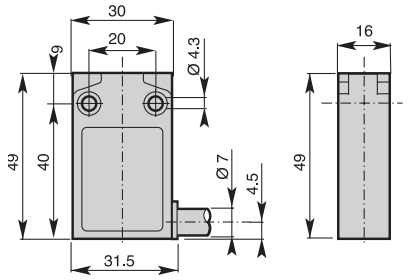
General technical data

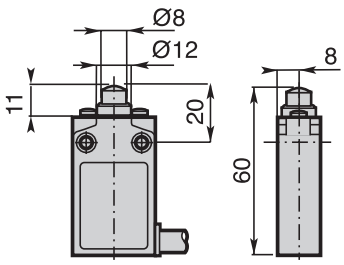
			Plastic casing
Standards			Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards
Certifications - Approvals			UL (upon request)
Ambient temperature			
– during operation		°C	– 25 ... + 70
– for storage		°C	– 40 ... + 70
Mounting positions			All positions are authorised
Protection against electrical shocks (acc. to IEC 536)			Class II
Degree of protection (according to IEC 529 and EN 60 529)			IP67
Degree of protection (according to UL50)			Type 1 enclosure ("indoor use only")
Electrical Data			
Rated insulation voltage U_i			
- according to IEC 947-1 and EN 60-947-1			400V (pollution degree 3) (250V for M12 connector)
- according to UL 508 and CSA C22-2 n° 14			B 300, R 300
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	4
Conventional free-air thermal current I_{th} (according to IEC 947-5-1) σ < 40 °C		A	5 (4A for M12 connector)
Short-circuit protection U_e < 500V a.c. - gG (gl) type fuses		A	6
Rated operational current			
I_e / AC-15 (according to IEC 947-5-1)	24V - 50/60Hz	A	5.0
	120V - 50/60Hz	A	3.0
	240V - 50/60Hz	A	1.5
I_e / DC-13 (according to IEC 947-5-1)	24V DC	A	1.1
	125V DC	A	0.22
	250V DC	A	0.1
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mΩ	25
Mechanical durability			10 millions of operations

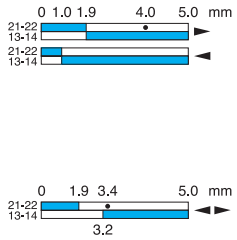
* For other cable inlets and cable lengths, please contact your local sales office.

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

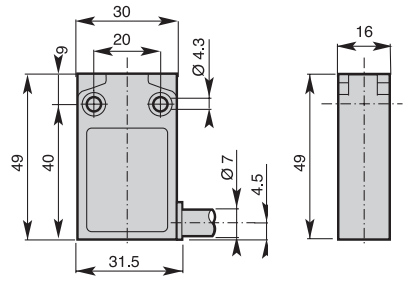
Plain plunger
MEP1G11•*

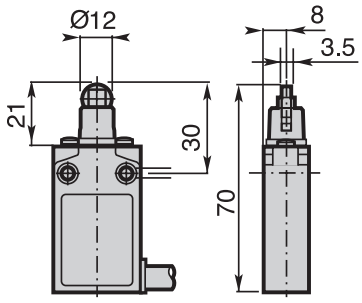


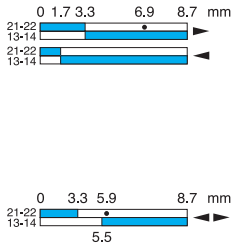




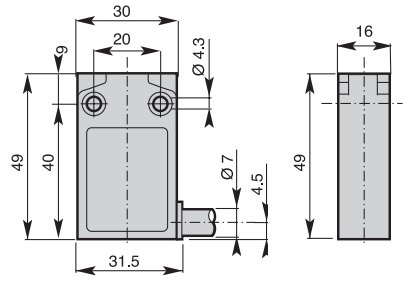
Roller plunger
MEP1G12•*
G12: metal roller
G13: nylon roller

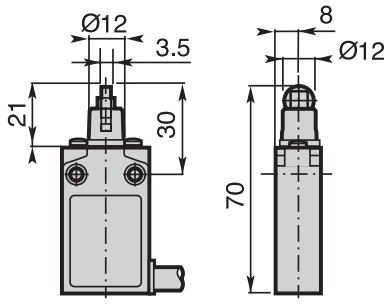


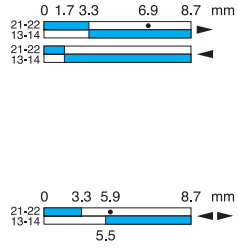




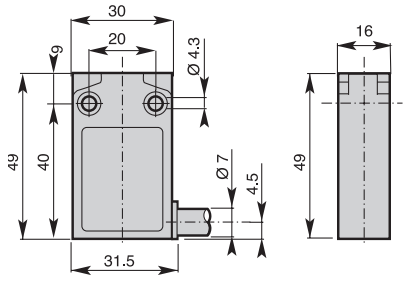
Cross roller plunger
MEP1G14•*
G14: metal roller
G15: nylon roller

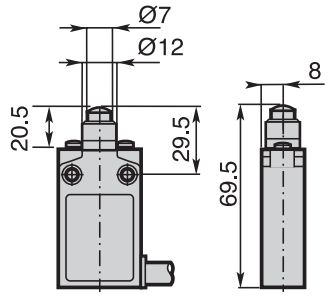


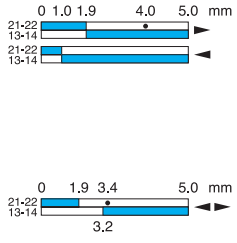




Plain plunger with dust protection cap
MEP1G16•*



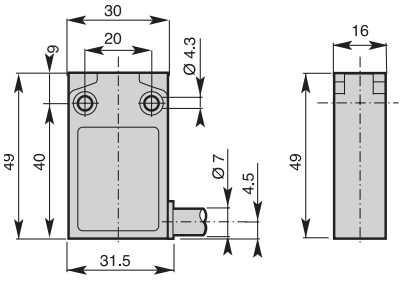


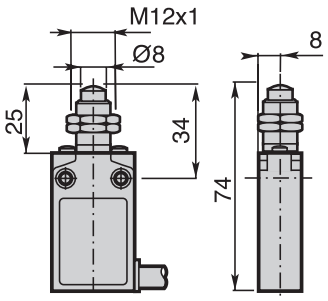


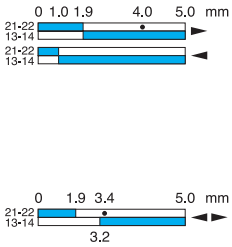
* Snap action: Z11, X11 or Y11

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

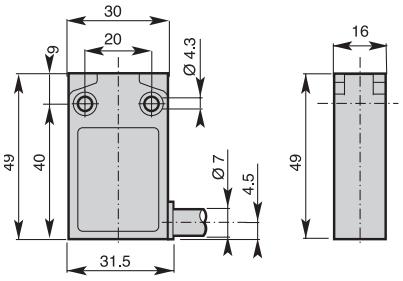
Plain plunger with fixing nuts
MEP1G21•*

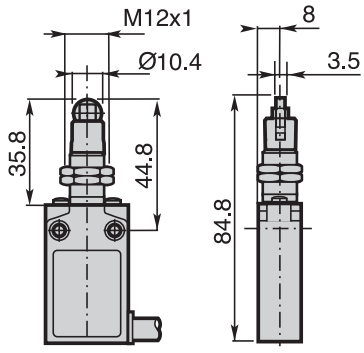


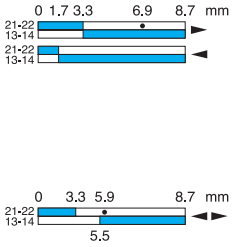




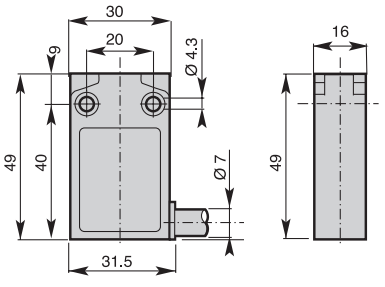
Roller plunger with fixing nuts
MEP1G22•*
G22: metal roller
G23: nylon roller

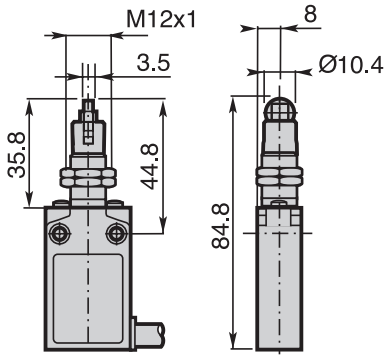


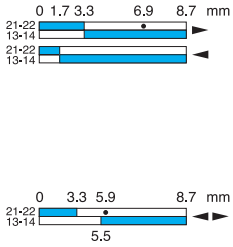




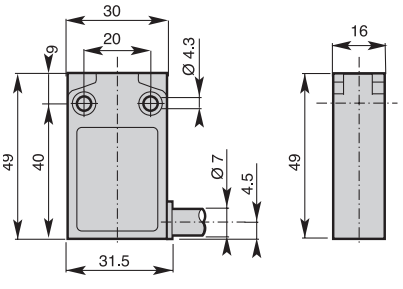
Cross roller plunger with fixing nuts
MEP1G24•*
G24: metal roller
G25: nylon roller

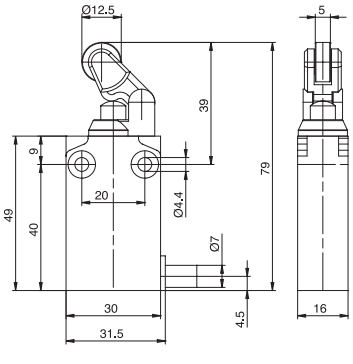


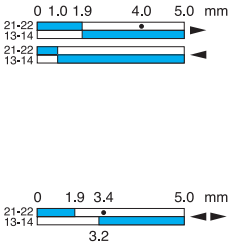




Plain plunger with fixing nuts
MEP1G31•*



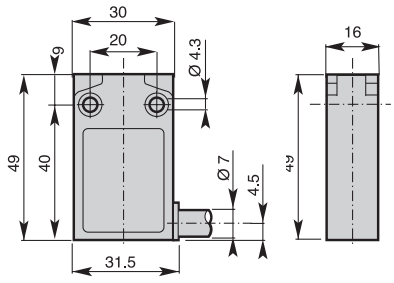


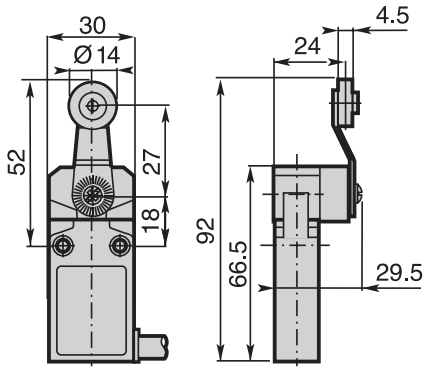


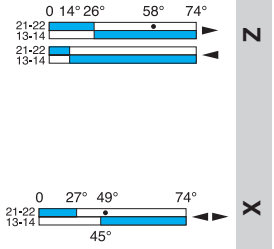
* Snap action: Z or X
** Snap action: Z

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

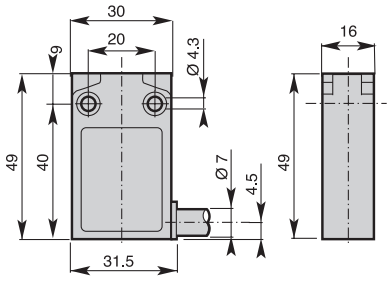
Roller lever
MEP1G41•*
G41: nylon roller
G42: metal roller
G43: ball bearing

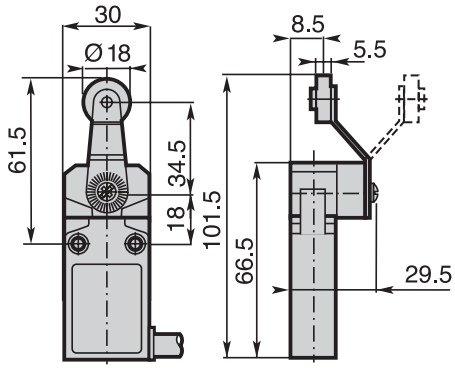


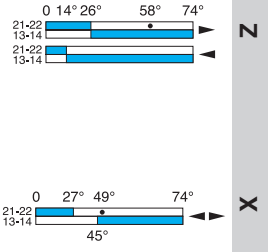




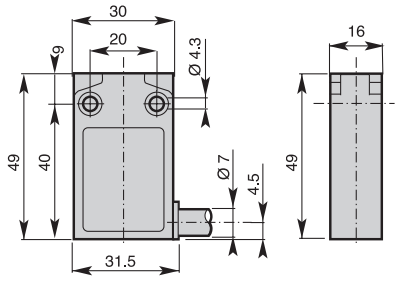
Nylon roller lever
MEP1G45•*

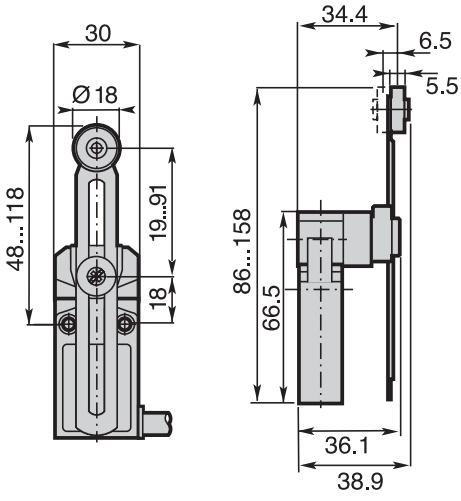


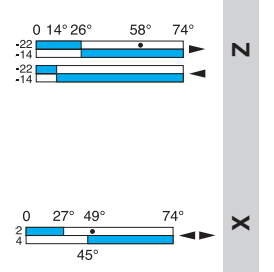




Adjustable lever with nylon roller
MEP1G51•*



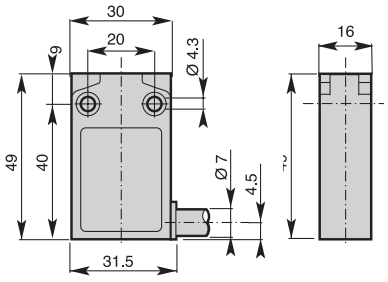


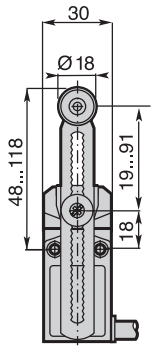


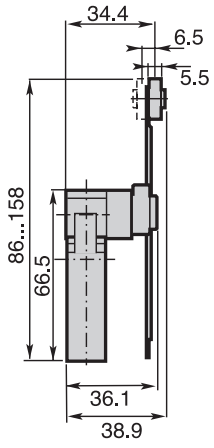
* Snap action: Z or X
** Snap action: Z

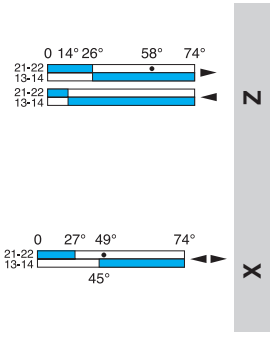
Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

Adjustable toothed lever (step 2mm) with nylon roller
MEP1G5100•*

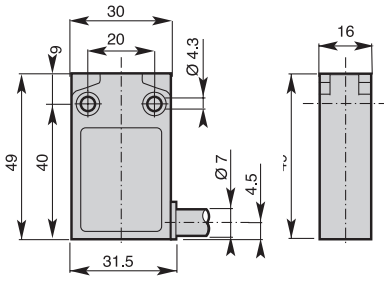


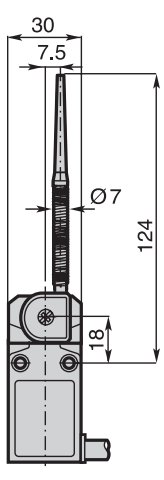


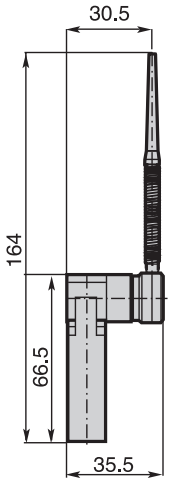


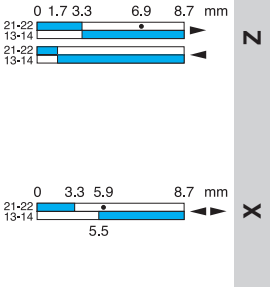


Nylon actuator with stainless steel spring
MEP1G61•*

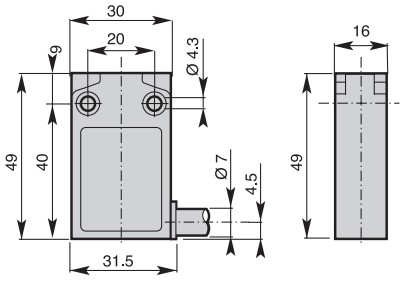


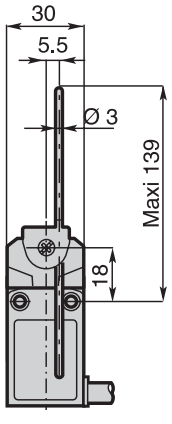


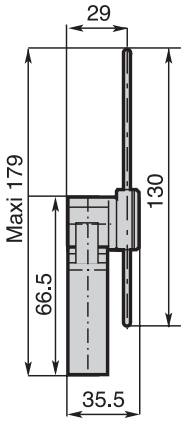


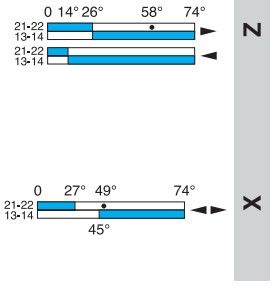


Adjustable rod lever
MEP1G71•*
G71: stainless steel rod
G72: fiberglass rod
G75: square steel rod





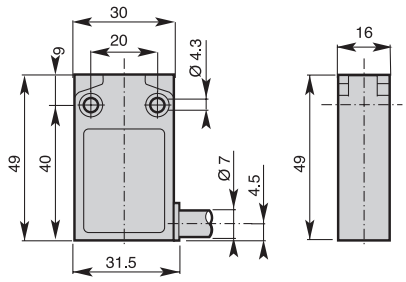


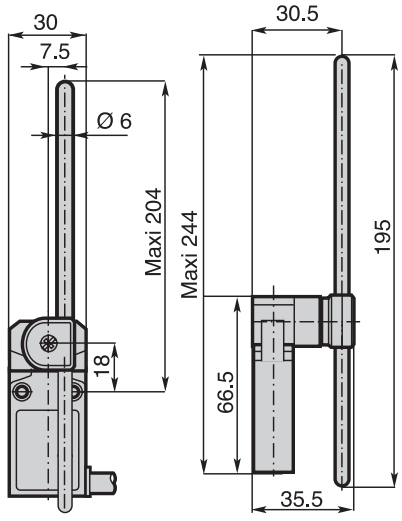


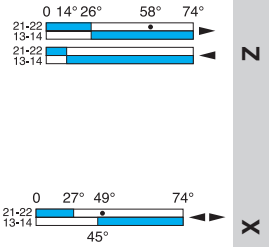
* Snap action: Z or X
** Snap action: Z

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

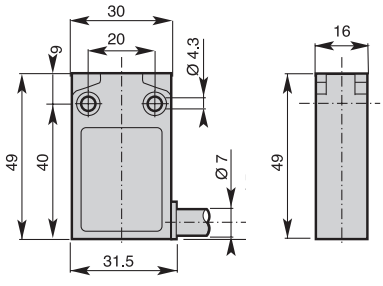
Adjustable rod lever
MEP1G73•*
G73: nylon rod
G74: fiberglass rod

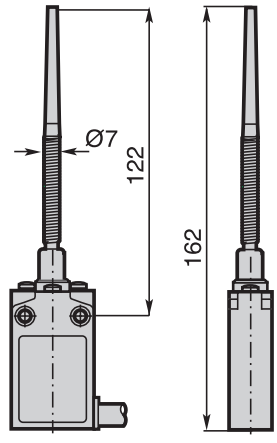


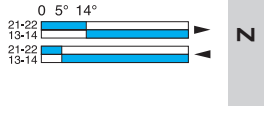




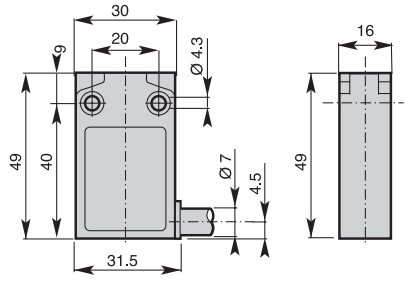
Multidirectional nylon actuator with stainless steel spring
MEP1G92•**

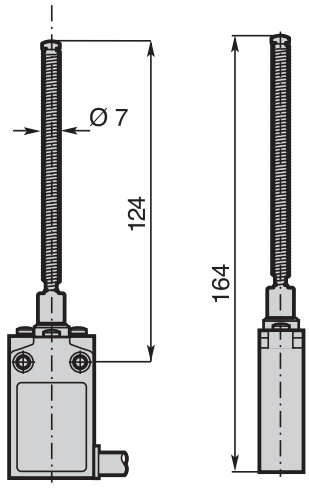


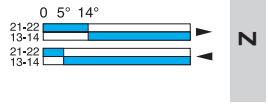




Multidirectional actuator with stainless steel spring
MEP1G93•**







* Snap action: Z or X
** Snap action: Z

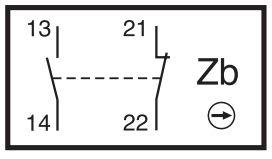
Ordering information

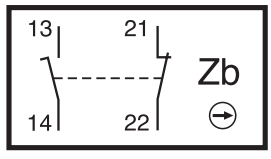
Example: M | EM1 | G12 | Z

- Casing: EM1 = metal casing 30mm width
- Actuators: codes G11 - G9999
- Contact block
  - Z: Zb Snap action 1 N.O. + 1 N.C.
  - X: Zb Slow action non-over-lapping late make 1 N.O. + 1 N.C.

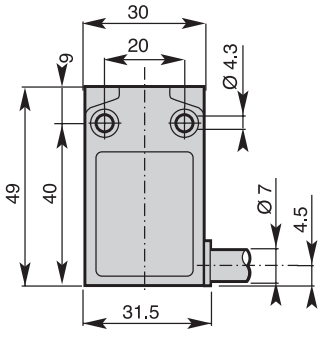
Contacts

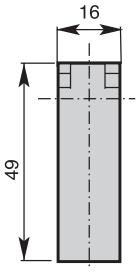
Z: Snap action 1 N.O. + 1 N.C. **X:** Slow action break before make 1 N.O. + 1 N.C.





Dimensions (basic)





Features

- Double Insulation
- 30mm width
- Casing made of metal
- Visible operation
- Able to switch strong currents (10A conventional thermal current)
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances
- Degree of protection: IP67
- Standard cable length 1m*..

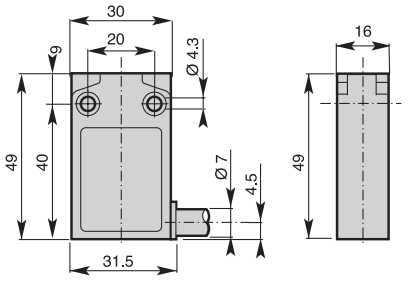
General technical data

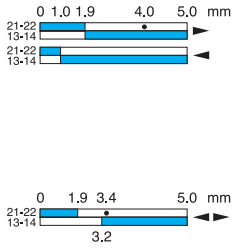
			Metal casing
Standards			Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards
Certifications - Approvals			UL (upon request)
Ambient temperature – during operation – for storage		°C °C	 – 25 ... + 70 – 40 ... + 70
Mounting positions			All positions are authorised
Protection against electrical shocks (acc. to IEC 536)			Class I
Degree of protection (according to IEC 529 and EN 60 529)			IP67
Degree of protection (according to UL50)			Type 4 - 4X - 6 enclosure ("outdoor use - raintight - water tight corrosion resistant"
Electrical Data			
Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14			 400V (pollution degree 3) (250V for M12 connector) B 300, R 300
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	4
Conventional free-air thermal current I_{th} (according to IEC 947-5-1) σ < 40 °C		A	5 (4A for M12 connector)
Short-circuit protection U_e < 500V a.c. - gG (gl) type fuses		A	6
Rated operational current			
I_e / AC-15 (according to IEC 947-5-1)	24V - 50/60Hz	A	5.0
	120V - 50/60Hz	A	3.0
	240V - 50/60Hz	A	1.5
I_e / DC-13 (according to IEC 947-5-1)	24V DC	A	1.1
	125V DC	A	0.22
	250V DC	A	0.1
Switching frequency	Cycles/h		3600
Load factor			0.5
Resistance between contacts	mΩ		25
Mechanical durability			10 millions of operations

* For other cable inlets and cable lengths, please contact your local sales office.

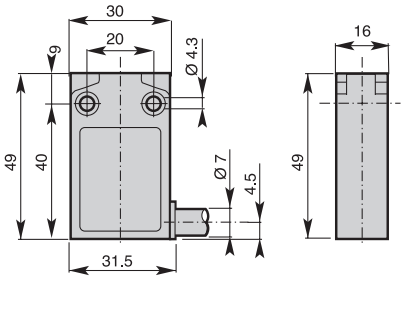
Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

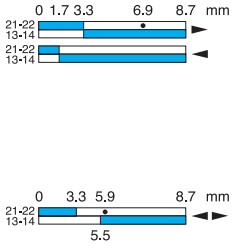
Plain plunger
MEM1G11•*



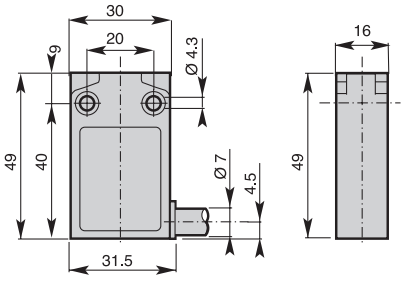


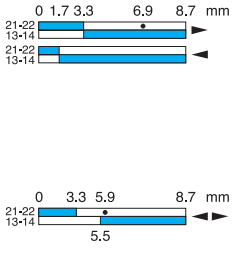
Roller plunger
MEM1G12•*
G12: metall roller
G13: nylon roller



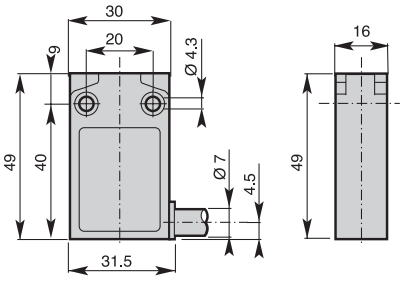


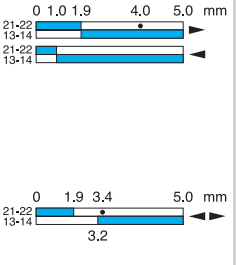
Cross roller plunger
MEM1G14•*
G14: metall roller
G15: nylon roller





Plain plunger with dust protection cap
MEM1G16•*

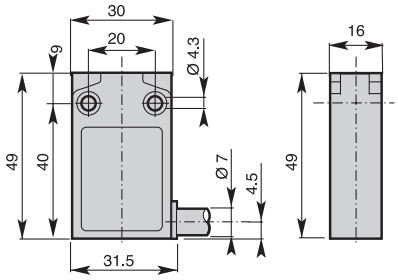


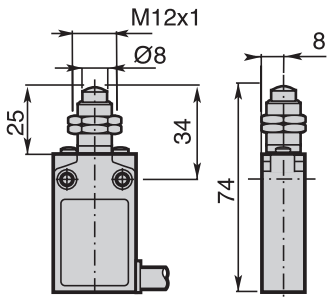


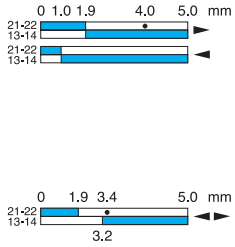
* Snap action: Z or X
** Snap action: Z

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

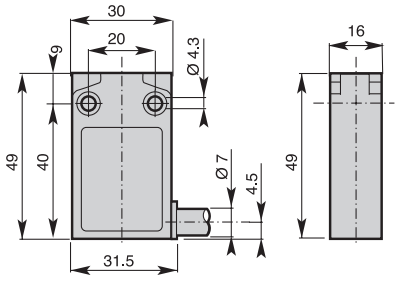
Plain plunger with fixing nuts
MEM1G21•*

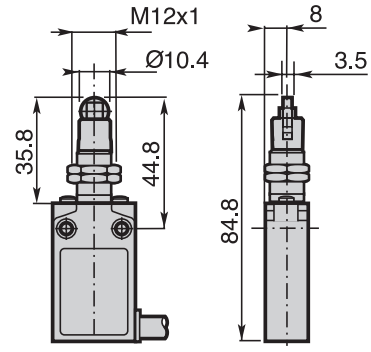


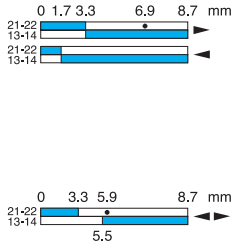




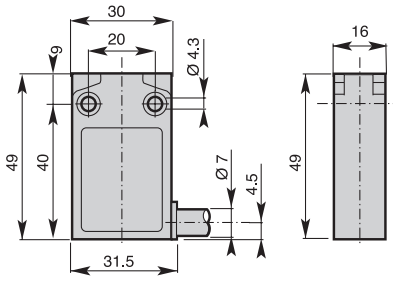
Roller plunger with fixing nuts
MEM1G22•*
G22: metall roller
G23: nylon roller

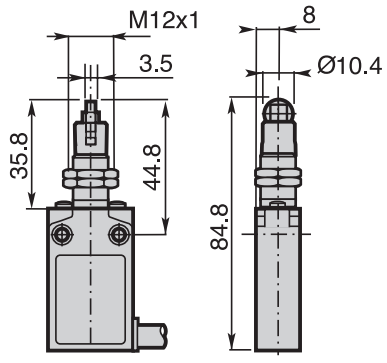


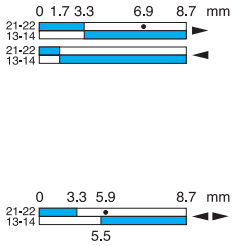




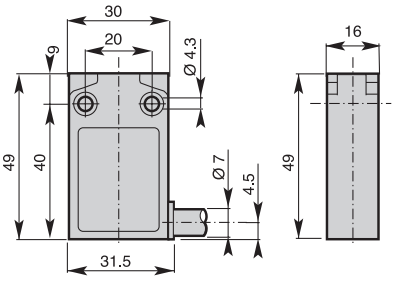
Cross roller plunger with fixing nuts
MEM1G24•*
G24: metall roller
G25: nylon roller

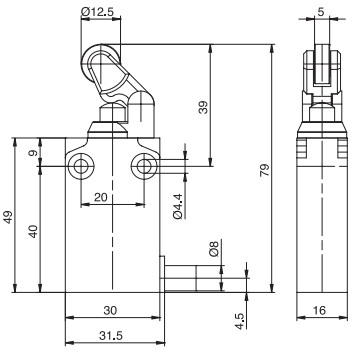


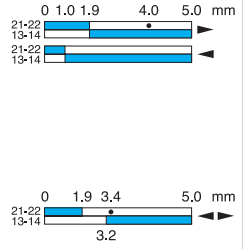




Plain plunger with fixing nuts
MEM1G31•*



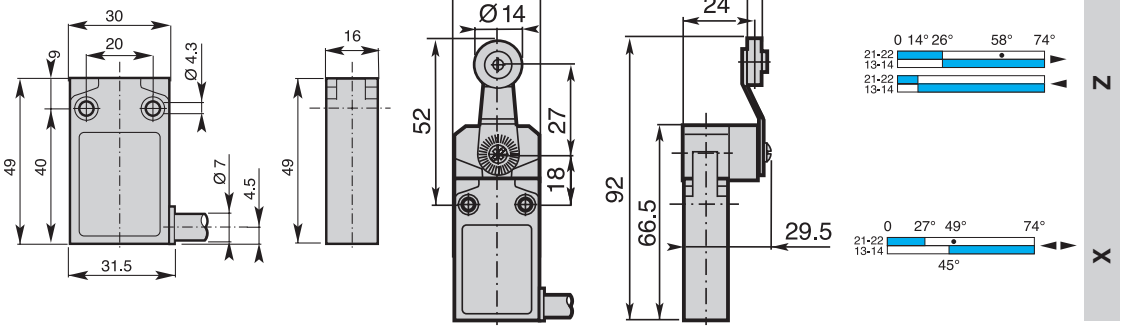




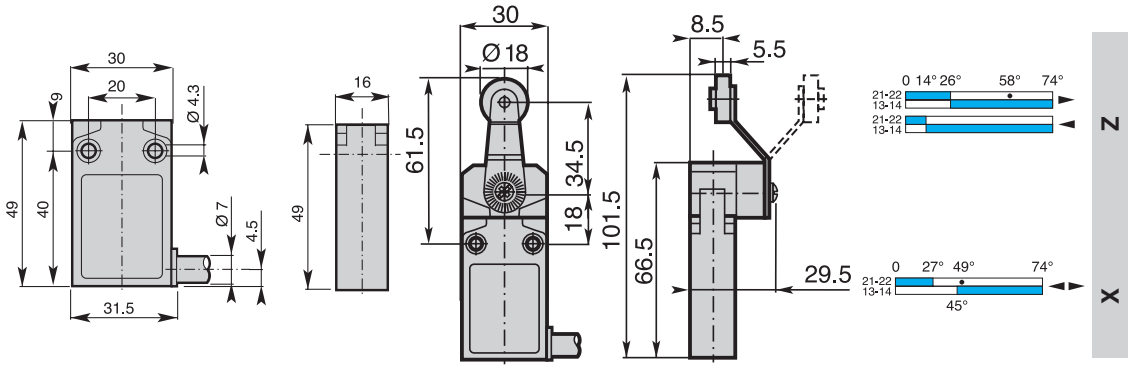
* Snap action: Z or X
** Snap action: Z

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

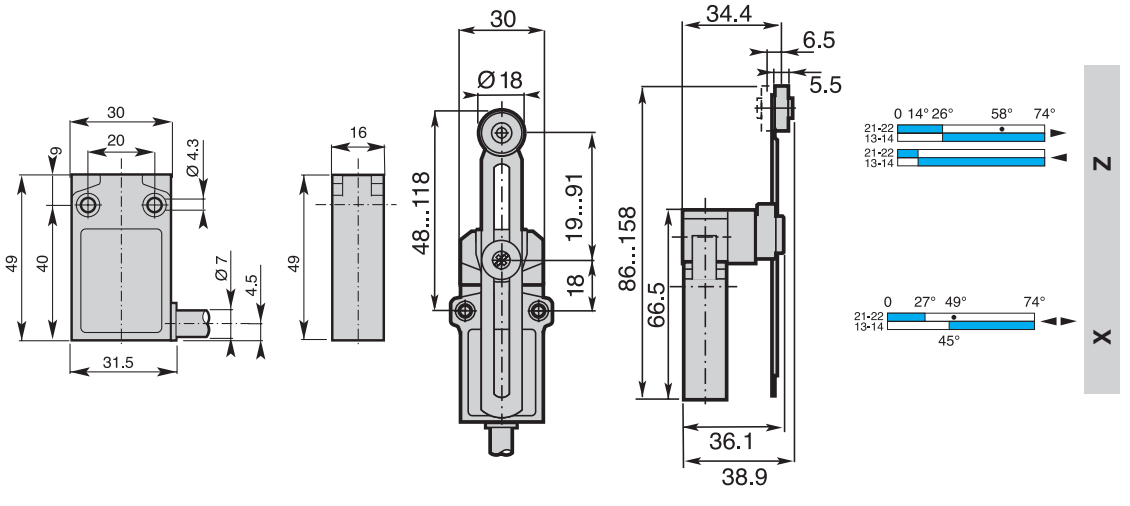
Roller lever
MEM1G41•*
G41: metal roller
G42: nylon roller
G43: ball bearing



Roller lever
MEM1G45•*
G45: nylon roller
G46: metal roller



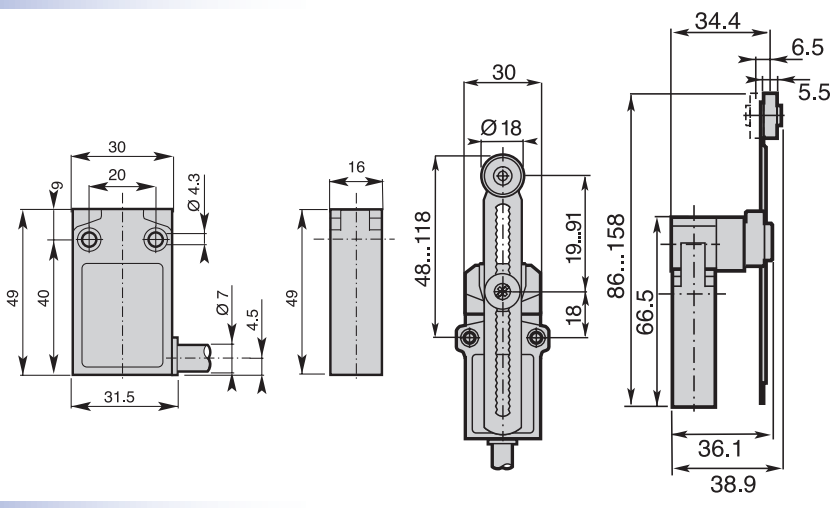
Adjustable lever with roller
MEM1G51•*
G51: nylon roller
G53: metal roller



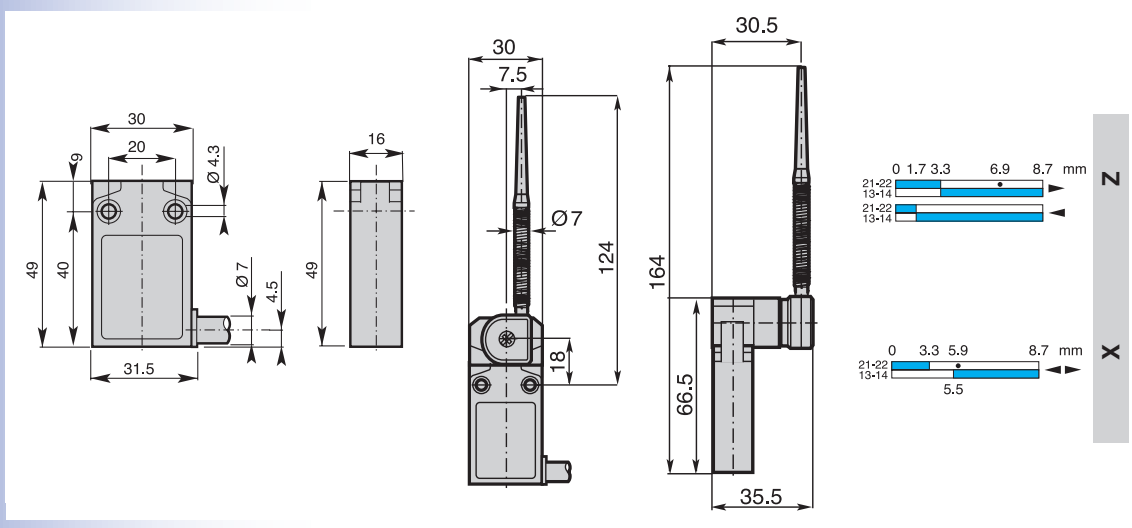
* Snap action: Z or X
** Snap action: Z

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

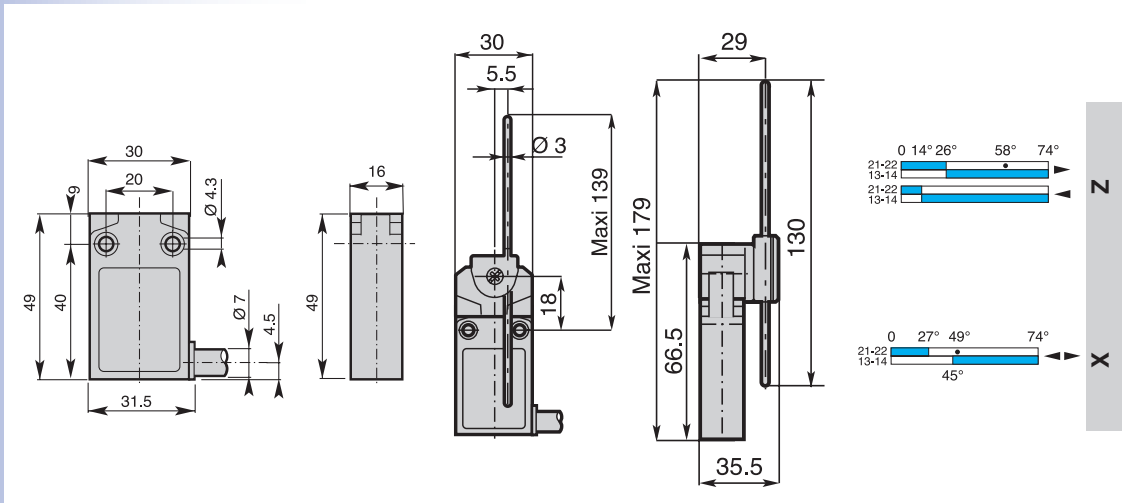
Adjustable toothed lever (step 2mm) with nylon roller
MEM1G5100•*



Nylon actuator with stainless steel spring
MEM1G61•*



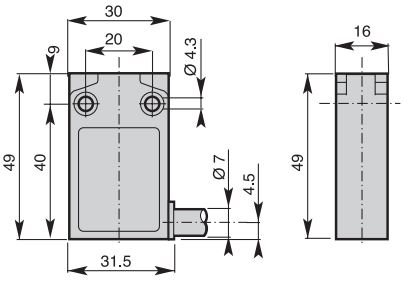
Adjustable rod lever
MEM1G71•*
G71: stainless steel rod
G72: fiberglass rod
G75: square steel rod

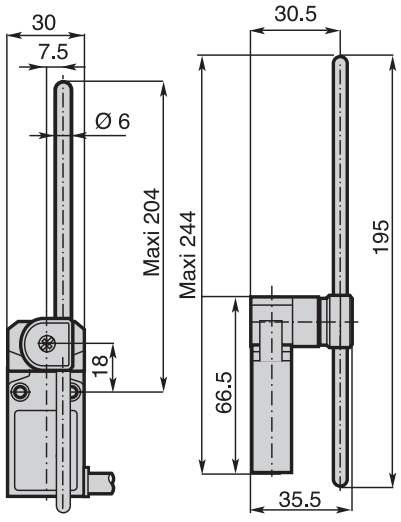


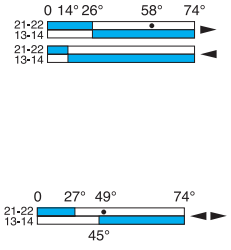
* Snap action: Z or X
** Snap action: Z

Product number	Dimensions (basic)	Dimensions (head)	Operation diagram

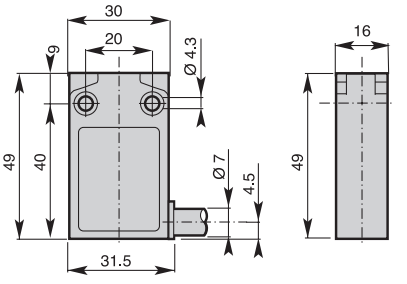
Adjustable rod lever
MEM1G73•*
G73: nylon rod
G74: fberglass rod

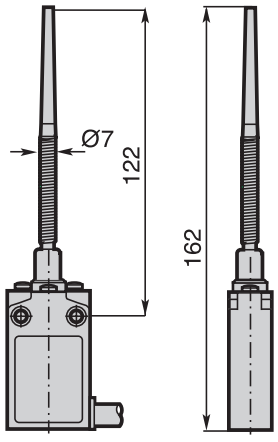


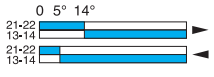




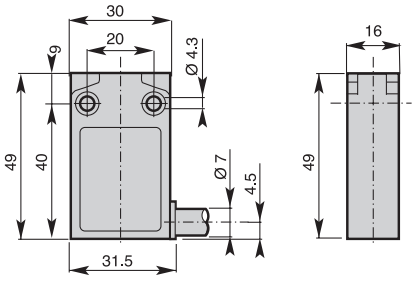
Multidirectional nylon actuator with stain-lessteel spring
MEM1G92•**

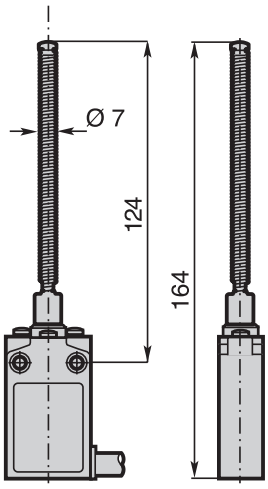


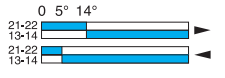




Multidirectional actuator with stainless steel spring
MEM1G93•**







* Snap action: Z or X
** Snap action: Z

The MAC-I products listed in this catalogue are developed and manufactured according to the rules set out in IEC international publications and EN European standard.

Specifications

- International Specifications
  The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.
- European Specifications
  The European Committee for Electrotechnical Standardisation (CENELEC), grouping 18 European countries, publishes EN standards for low voltage industrial apparatus.
  These European standards differ very little from IEC international standards and use a similar numbering system. The same is true of national standards. Contradicting national standards are withdrawn.
- Harmonised European Specifications
  The European Committees for Standardisation (CEN and CENELEC), grouping 18 European countries, publish EN standards relating to safety of machinery.
- Specifications in Canada and the USA
  These are equivalent, but differ markedly from IEC, UTE, VDE and BS specifications.
  UL Underwriters Laboratories (USA)
  CSA Canadian Standards Association (Canada)

Remark concerning the label issued by the UL (USA). Two levels of acceptance between devices must be distinguished.

"Recognized"	Authorised to be included in equipment, if the equipment in question has been entirely mounted and wired by qualified personnel. They are not valid for use as "General purpose products" as their possibilities are limited. They bear the mark:
"Listed"	Authorised to be included in equipment and for separate sale are "General purpose products" components in the USA. They bear the mark:

European Directives

The guarantee of free movement of goods within the European Community assumes elimination of any regulatory differences between the member states. European Directives set up common rules that are included in the legislation of each state while contracditory regulations are cancelled.

There are three main directives:

- Low Voltage Directive 2006/95/CE concerning electrical equipment from 50 to 1000V a.c. and from 75 to 1500V d.c.
  This specifies that compliance with the requirements that is sets out is acquired once the equipment conforms to the standards harmonised at European level: EN 60947-1 and EN-60947-5-1 for limit switches.
- Machines Directives - 2006/42/CE defining main safety and health requirements concerning design and manufacture of the machines and other equipment including safety components in European Union countries.
- Electromegnetic Compatibility Directive 2004/108/CE concerning all electrical devices likely to create electromagnetic disturbances.

Signification of CE marking:

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

Standards

- International Standards

IEC 947-1	Low-voltage switchgear and controlgear - Part 1: General Rules (CEI EN 60947-1).
IEC 947-5-1	Low-voltage switchgear and controlgear - Part 5: Control circuit devices and switching elements - Section 1: Electromechanical control circuit devices (CEI EN 60947-5-1) - Chapter 3: Special requirements for control switches with positive opening operation.
IEC 204-1	Electrical equipment on industrial machines - Part 1: General requirements (CEI EN 60204-1).
IEC 204-2	Electrical equipment on industrial machines - Part 2: Item designation and examples of drawings, diagrams, tables and instructions.
IEC 529	Degrees of protection provided by enclosure (IPcode) (CEI EN 60529).

- European Standards

EN 50005	Low-voltage switchgear and controlgear for industrial use - Terminal marking and distinctive number: General rules (CEI 17-17).
EN 50013	Low-voltage switchgear and controlgear for industrial use - Terminal marking and distinctive number for particular control swithches (CEI 17-17).
EN 50041	Low-voltage switchgear and controlgear for industrial use - Control switches - Position switches 42,5 x 80 - Dimensions and characteristics.
EN 50047	Low-voltage switchgear and controlgear for industrial use - Control switches - Position switches 30 x 55 - Dimensions and characteristics.
EN 60947-1	Low-voltage switchgear and controlgear for industrial use - Part 1: General rules (CEI EN 60947-1).
EN 60947-5-1	Low-voltage switchgear and controlgear for industrial use - Part 5: Control circuit devices and switching elements - Section 1: Electromechanical control circuit devices (CEI EN 60947-5-1) - Chapter 3: Special requirements for control switches with positive opening operation.
EN 60529	Degrees of protection provided by enclosures (IPcode).
EN 61058-1	Switches for appliances. Part. 1: general requirements.

- American Standards

UL 508	Standard for safety. Industrial control equipment.
CSA - C22.2 No. 14-95	Industrial control equipment. Industrial products.

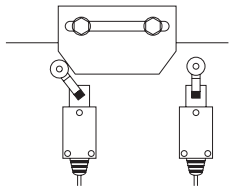
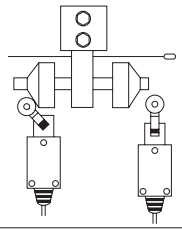
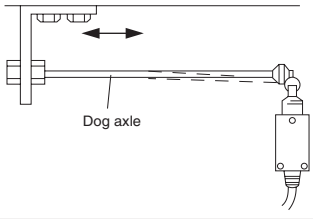
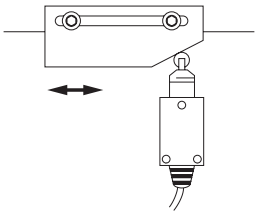
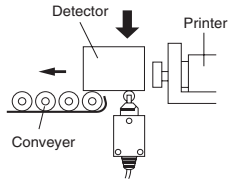
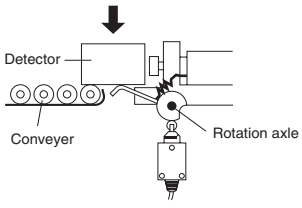
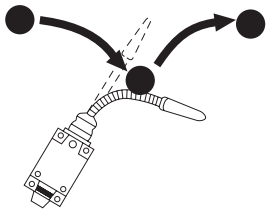
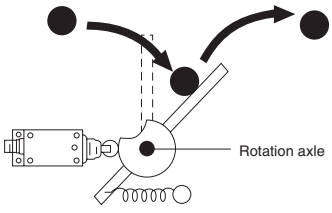
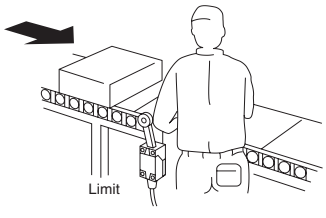
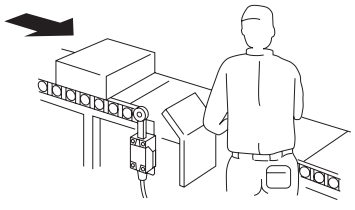
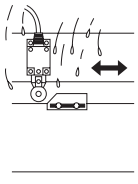
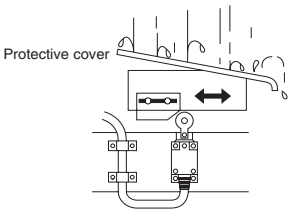
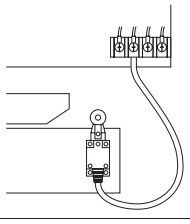
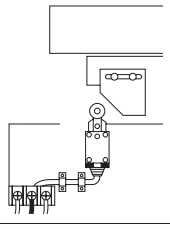
Panasonic ↔ MAC-I products

AZ8	Actuator	MAC-I equivalent
AZ8104CEJ	Roller arm	MAM1F41Z11
AZ8107CEJ	Adjustable rod	MAM1F71Z11
AZ8108CEJ	Adjustable roller arm	MAM1F51Z11
AZ8111CEJ	Push plunger	MAM1F11Z11
AZ8112CEJ	Roller plunger	MAM1F12Z11
AZ8122CEJ	Cross roller plunger	MAM1F12Z11
AZ8166CEJ	Flexible rod	MAM1T92Z11
AZ8169CEJ	Spring wire	MAM1T91Z11

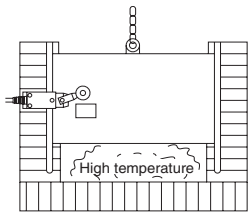
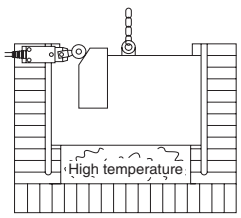
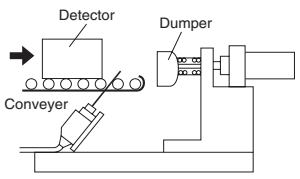
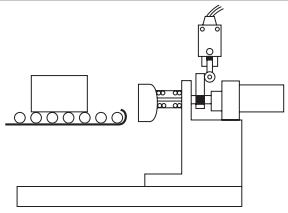
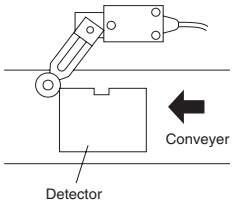
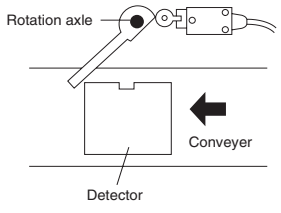
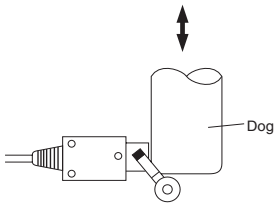
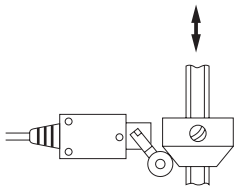
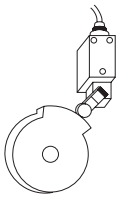
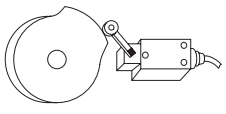
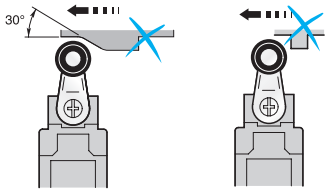
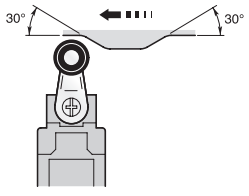
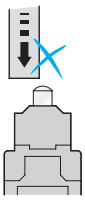
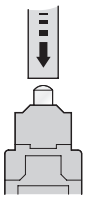
AZ7	Actuator	MAC-I alternative
AZ7100CEJ	Short push plunger	MEP1G11Z
AZ7110CEJ	Push plunger	MEP1G16Z
AZ7120CEJ	Hinge lever	MEP1G31Z
AZ7121CEJ	Roller lever	MEP1G31Z
AZ7124CEJ	One-way roller lever	MEP1G31Z
AZ7140CEJ	Hinge short lever	MEP1G31Z
AZ7141CEJ	Short roller lever	MEP1G31Z
AZ7144CEJ	One-way short roller lever	MEP1G31Z
AZ7166CEJ	Flexible rod	MEP1G92Z
AZ7310CEJ	Panel mount push plunger	MEP1G21Z
AZ7311CEJ	Panel mount roller plunger	MEP1G22Z
AZ7312CEJ	Panel mount cross roller plunger	MEP1G24Z

AZD1	Actuator	MAC-I equivalent
AZD1050CEJ	Roller lever	MAP1T30Z11
AZD1051CEJ	Push plunger	MAP1T10Z11
AZD1052CEJ	Roller plunger	MAP1T13Z11
AZD1053J	Adjustable roll lever	MAP1T52Z11
AZD1054CEJ	Roller arm	MAP1T41Z11
AZD1057J	Adjustable rod operator	MAP1T71Z11
AZD1058CEJ	Adjustable roller arm	MAP1T51Z11
AZD1059J	Roller lever, vertical operation	MAP1T36Z11

Installation information

Incorrect	Correct	Explanation
		■ Problem • Dog adjustment is difficult. ■ Solution • Separate each one until the dog can be adjusted.
		■ Problem • The dog axis is too long and slips out during operation. • For this reason, the limit switch operating position slips. ■ Solution • Firmly fix the dog plate to the base.
		■ Problem • The detector sinks, applying force to the limit switch. • The limit switch O.T. cannot be set. ■ Solution • Relieve the pressure using an additional actuator, and the O.T. can also be set.
		■ Problem • The area around the actuator coil is easily damaged. • Friction is generated during operation. ■ Solution • Relieve the friction by installing an additional actuator. • Change the type of limit switch.
		■ Problem • Workers keep bumping the actuator. ■ Solution • Fit a protective cover to the side of the limit switch.
		■ Problem • Because the cord vent for the limit switch faces upwards, water droplets and so forth can easily penetrate the interior. • The cord is constantly moving and thus easily damaged. ■ Solution • Fix the limit switch position on the stationary board. • Fit a protective cover so that water and oil cannot come into direct contact with the limit switch.
		■ Problem • The cord is not fixed, and gets pulled during work. • Dog adjustment is ineffective. ■ Solution • Change the limit switch position, and fix the cord. • Attach an adjustment mechanism to the dog.

Installation information

Incorrect	Correct	Explanation
		■ Problem • The limit switch is near a high-temperature area. • Dog adjustment is ineffective, and the dog keeps bumping the lever. ■ Solution • Move the limit switch further away. • Make dog adjustment possible, and change the shape of the unit.
		■ Problem • The detector is scratched. • Limit attachment adjustments are difficult • The actuator is damaged. • Specimen transfer is impeded. ■ Solution • Fix the limit position to behind the dumper to solve the above problems.
		■ Problem • The transfer path of the detector is not fixed and it keeps bumping the actuator. • The operating position is unstable. • The actuator is damaged. ■ Solution • Stabilize the operating position by fitting an additional actuator. • Make limit switch adjustment possible.
		■ Problem • Stroke adjustment ineffective. • Release the limit switch position and ensure that the dog does not bump the lever. ■ Solution • Make dog adjustment possible. • Change the limit switch position and ensure that the dog does not bump the lever.
		■ Problem • The rubber shape is unsuitable (especially during release and strike release). • Direction of limit switch attachment is unsuitable. ■ Solution • Render the rubber shape smooth. • Change the limit switch position.
		
		

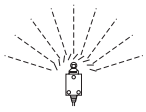
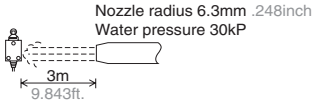
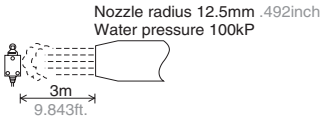
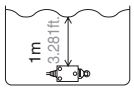
Protective construction

Expresses the degree of protection that guards the level of functionality of the switch against ingress of solid objects, water, and oil. The standards are IEC 529 (IEC : International Electrotechnical Commission) standards. IEC standards determine the level of protection against both water and solid objects but not against oil.

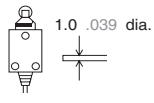
Protection against both water and solid objects

IP☐ ☐

Protection against water

	Protection level	Level Protection level and test methods	
0	**No particular protection**	—	
3	**Protection against sprays to 60° from the vertical**		No damage incurred when sprayed with water continuously for 10 minutes at angles of up to 60° from the vertical.
4	**Protection against water splashed from all directions**		No damage incurred when sprayed with water continuously for 10 minutes at angles of up to 180° from the perpendicular across a wide area.
5	**Protection against jets of water**		No damage incurred when sprayed with a jet of water for 3 minutes from all directions, as per the diagram on the left.
6	**Protection against strong jets of water**		Water does not invade the interior when sprayed with a jet of water for 3 minutes from all directions, as per the diagram on the left.
7	**Protection against the effects of immersion**		Water does not invade the interior during immersion for 30 minutes at a depth of 1m.

Protection against solid foreign matter

Level	Protection level	Protection level and test methods	
4	**Protection against solid objects exceeding 1mm in size**		A hard wire (diameter: 1mm) cannot penetrate the inside.
5	**Protection against dust. Limited ingress of dust permited. (no harmful deposit)**		The unit is left for 8 hours in an atmosphere in which 2kg of talcum powder per $1m^3$ is floating. No damage incurred from talcum powder penetrating the inside.
6	**Totally protected against ingress of dust**		The unit is left for 8 hours in an atmosphere in which 2kg of talcum powder per $1m^3$ is floating. The talcum powder does not penetrate the inside.

Notes: 1. All of the tests cited above were conducted with the cord vent (conduit vent) tightly shut.
2. The above protective constructions are based on IEC standard but major differences may arise due to length of use and operating environment. This should be thoroughly discussed and verified.
3. When the corrosion-proof model is immersed in water for 30 minutes or more, verify that no water has penetrated the inside before use.

Notes

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Panasonic Eco components help you to save energy and protect the environment, maintain and manage your energy-saving and environmental measures. Guards against wasted electricity.

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Panasonic's award winning UV curing system, Aicure UJ30/35, is an LED technology based curing system that quickly hardens UV-sensitive resin such as adhesives, ink, and coatings. It is especially suited for precise and high-intensity curing of punctiform or small areas.

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