IEC Limit Switches

AAM Series Metal Housing (Stainless Steel Spring Actuator)

- Small body allows mounting in tight spaces
- Durable cast metal housing
- Single conduit 1/2" NPT opening or 5-pin M12 quick disconnect
- 1 N.O. and 1 N.C. contact on all units
- Snap-action (Z11) contacts

AAM Series Limit Switches With Metal Enclosure Selection Chart							
Part Number	***Price***	***Drawing Link***	***Actuator Type***	***Max. Actuation Speed (m/s [ft/sec])***	***Min. Actuation Force (N) or Torque (N•m)***	***Min. Positive Opening Force (N) or Torque (N•m)***	***Connection Type***
AAM2T93Z11		PDF	360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	1/2-in NPT cable entry
AAM7T93Z11		PDF	360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	5-pin M12 quick-disconnect (bottom)

AAM2T93Z11

Housing style

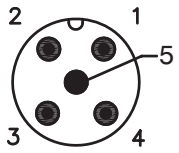
1/2-in NPT cable entry

5-pin M12 quick-disconnect (bottom)

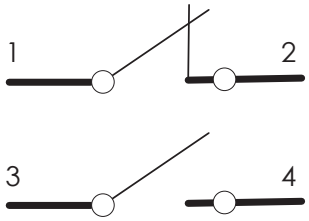
IEC Limit Switches

AAM Series Metal Housing (Stainless Steel Spring Actuator)

Connector

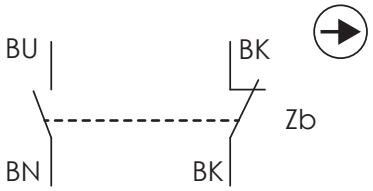


Contact Configuration



NOTE: Pin 5 is housing ground

Z11 Snap-action contacts
1 N.O. and 1 N.C.



IEC General Specifications

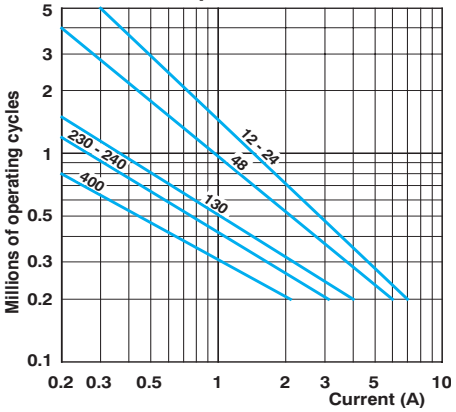
IEC General Specifications Environmental				
Type		***Plastic***		***Metal***
Environmental				
Degree of Protection		IEC IP65		IEC IP66
Temperature Range [1]		Stocking: -30 to 80°C (-22 to 176° F) Working: -25 to 70°C (-13 to 158°F)		Stocking: -30 to 80°C (-22 to 176°F) Working: -10 to 70°C (14 to 158°F);
Rated Insulation Voltage		690V (degree of pollution 3)		
Mechanical Ratings				
Working Positions [2]		All actuators can be rotated in 90° increments		
Mechanical Life		Straight line working heads: 30 million operations	Side rotary heads: 25 million operations,	Multidirectional heads: 10 million operations
Enclosure Material		Fiberglass-reinforced plastic-V0 class (UL94)		Die-cast aluminum
Contact Blocks Rating				
Positive Opening [3]		Yes, all models		
Electrical Ratings	***AC15***	Make: 60A@120VAC; 30A @ 240VAC; 18A @ 400VAC Break:10A @ 24VAC; 6.5 A @130VAC; 3.1 A @ 230VAC; 1.8 A @ 400VAC		
	DC13	2.8A @ 24VDC; 0.5A @ 110VDC		
Maximum Switching Frequency		Contact blocks: all two cycles per second		
Repeat Accuracy		0.01 mm on the operating points at 1 million operations		
Short-Circuit Protection		Cartridge fuses gl 10A-500V 10.3x38 1 100KA		
Contact Resistance		0.025 Ω		
Recommended Minimum Operating Speed		With snap-action contacts: 20mm [0.787 in] per minute [4] With slow-action contacts: 500mm [19.685 in] per minute [5]		
Rated Insulation Voltage		660V		
Terminals Marking		According to CENELEC EN 50013		
Wiring Connections		2 x 2.5mm^2 (AWG14) to 2 x 0.5mm^2 (AWG18)		
Wiring Terminal Type		Captive screw with self-lifting pressure plate		
Wiring Terminal Markings		According to CENELEC EN50013		
User Protection		Double insulation (plastic models only)		
Contact Blocks Performance				
Operation Frequency		3600 ops/h		
Electrical Durability (according to IEC 947-5-1)		Utilization categories AC-15 and DC-13; load factor of 0.5. See table and curves in supplemental section.		
Approvals		UL file E191072, CE		
Tools Needed		Phillips screwdriver, #1 #2 / Hex wrench, 10mm		

1. Minimum temperatures assume that the atmosphere is free of moisture, which could cause moving parts to freeze up.
2. Some types of actuators, such as a long, heavy spring with the adjustable actuator fully extended, may not work properly if installed in a horizontal position.
3. Positive opening in a snap-action contact block is performed by a rigid mechanism that forces the N.C. contact to open in case the snap action mechanism fails. This would provide protection if, for example, the contacts became "welded" together by excessive current rush. Generally, positive opening is not considered to work properly on switches with actuators that are not a solid design (such as a spring or rubber roller), despite the fact that the contact block itself has positive opening. In order to be considered as having positive opening, a switch must not have flexible components between actuator actioning points and the electrical contact.
4. This is the speed at which snap-action contact blocks are tested. There is no minimum operating speed for snap-action contacts because the speed has no influence on the switch action. When using spring actuators, the changeover time may vary from 1ms to 3ms from maximum to minimum operating speed.
5. Slow-action contacts must not be operated at very low speeds because of the tendency to maintain the arc if contacts are not rapidly separated.

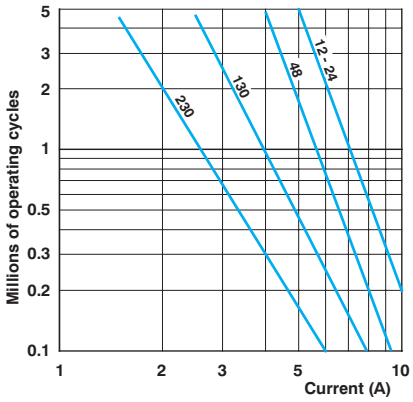
Limit Switches Supplemental

Electrical Durability (according to IEC 947-5-1)

AC-15 Snap Action



AC-15 Slow Action



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

Limit switch types

Snap-action contact: A contact element in which the contact motion is independent of the speed of the actuator. This feature ensures reliable electrical performance even in applications involving very slow moving actuators.

Slow-make/slow-break contacts: A contact element in which the contact motion is dependent on the actuator speed.

Terminal identification (IEC)

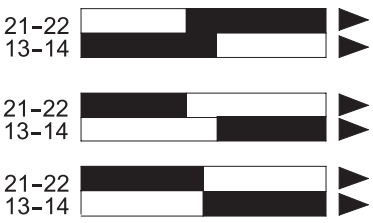
Each terminal is marked with two digits. The first digit indicates the pole (circuit). The second digit indicates the type of contact.

_1-_2 is N.C., _3-_4 is N.O.
so 11-12, 21-22 are N.C., while 13-14, 23-24 are N.O.

Terminal Markings	
European	
Terminal No.	*Type*
11-12	N.C. contact of pole no. 1 [1]
13-14	N.O. contact of pole no. 2 [1]
21-22	N.C. contact of pole no. 2 [2]
23-24	N.O. contact of pole no. 1 [2]

[1] With non-isolated contacts [2] With isolated contacts

Note: Green/yellow wire is physical earth ground.



= Contact open

= Contact closed

Make-before-break (overlapping) SPDT: the N.O. contact closes before the N.C. contact opens. (See ex: Y11)

Break-before-make (offset) SPDT: the N.C. contact opens before the N.O. contact closes. (See ex: X11)

Simultaneous make and break SPDT: the N.C. contact opens at the same time as the N.O. contact closes. (See ex: Z11)

Bar Chart Examples
(cam angle is 30 degrees)

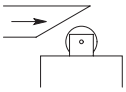
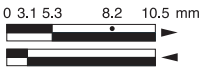


Diagram in millimeters/cam travel



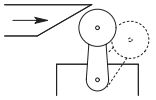
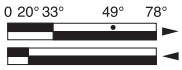


Diagram in degrees/lever rotation



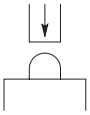
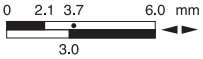


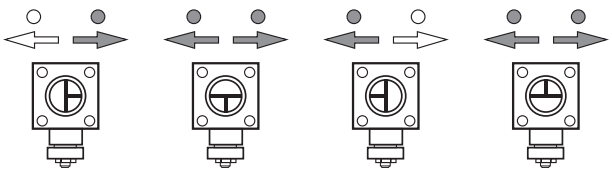
Diagram in millimeters/plunger trave



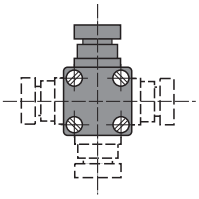
Changeable working heads (E42, E52, E71)

View of cam insert when looking at bottom of head once removed from switch body.

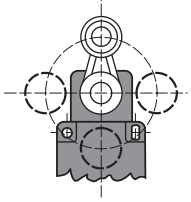
To change position, push in and twist until it locks into place



Positioning - 90º each way

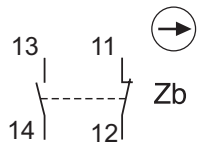


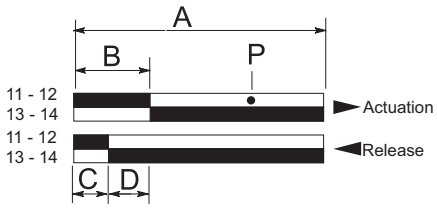
Adjustable lever from 0-360º (6º each increment)



Contact Displacement Values

Z11 Snap Action Contacts
1 N.O. and 1 N.C.





A = Max. travel of the operator in mm or degrees

B = Tripping travel of both contacts on actuation

C = Tripping travel of both contacts on release

D = Differential travel (between actuation and release)

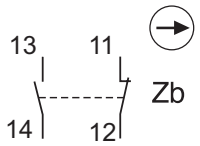
P = Point from which positive opening is assured during actuation

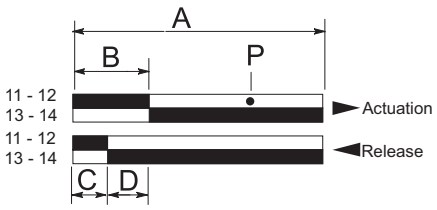
Contact Displacement Values				
Part Series	***Displacement Values — mm [in] or degrees***			
	A	***B***	***C***	***P***
AEM Halogen				
AEM2G12Z11-HF1	8.7 [0.343]	3.8 [0.150]	2.4 [0.095]	7.5 [0.295]
AEM2G16Z11-HF1	5 [0.197]	2.2 [0.867]	1.4 [0.055]	4.3 [0.169]
AEM2G42Z11-HF1	74°	32°	21°	65°
AEM2G51Z11-HF1	74°	32°	21°	65°
AEM2G71Z11-HF1	74°	32°	21°	65°
AEM2G93Z11-HF1	—	10°	20°	—
AEP Series				
AEPxG11Z11x	5 [0.197]	2.2 [0.867]	1.4 [0.055]	4.3 [0.169]
AEPxG12Z11x	8.7 [0.343]	3.8 [0.150]	2.4 [0.095]	7.5 [0.295]
AEPxG16Z11x	5 [0.197]	2.2 [0.867]	1.4 [0.055]	4.3 [0.169]
AEPxG41Z11x	74°	32°	21°	65°
AEPxG42Z11x	74°	32°	21°	65°
AEPxG43Z11x	74°	32°	21°	65°
AEPxG51Z11x	74°	32°	21°	65°
AEPxG71Z11x	74°	32°	21°	65°
AEPxG92Z11x	—	10°	20°	—
AEPxG93Z11x	—	10°	20°	—
AAM Series				
AAMxF11Z11x	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
AAMxF12Z11x	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
AAMxT14Z11x	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
AAMxT35Z11x	21 [0.827]	9 [0.354]	4.5 [0.177]	14.5 [0.571]
AAMxF43Z11x	74°	31°	17°	47°
AAMxF46Z11x	74°	31°	17°	47°
AAMxF53Z11x	74°	31°	17°	47°
AAMxF71Z11x	74°	31°	17°	47°
AAMxT93Z11x	—	12°	23°	—
AAP Series				
AAPxT10Z11x	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
AAPxT13Z11x	9.6 [0.378]	4.7 [0.185]	2.5 [0.098]	7.6 [0.299]
AAPxT14Z11x	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
AAPxT35Z11x	21 [0.827]	9 [0.354]	4.5 [0.177]	14.5 [0.571]
AAPxT41Z11x	74°	31°	17°	47°
AAPxT42Z11x	74°	31°	17°	47°
AAPxT45Z11x	74°	31°	17°	47°
AAPxT51Z11x	74°	31°	17°	47°
AAPxT5100Z11x	74°	31°	17°	47°
AAPxT5200Z11x	74°	31°	17°	47°
AAPxT71Z11x	74°	31°	17°	47°
AAPxT93Z11x	—	12°	23°	—

Contact Displacement Values tables contined on next page

Contact Displacement Values (continued)

Z11 Snap Action Contacts
1 N.O. and 1 N.C.





A = Max. travel of the operator in mm or degrees

B = Tripping travel of both contacts on actuation

C = Tripping travel of both contacts on release

D = Differential travel (between actuation and release)

P = Point from which positive opening is assured during actuation

Contact Displacement Values				
Part Series	***Displacement Values — mm [in] or degrees***			
	A	***B***	***C***	***P***
ABM Series				
ABMxE11Z11	6.0 [0.235]	3.0 [0.118]	1.8 [0.071]	4.6 [0.181]
ABMxE13Z11	10.5 [0.413]	5.3 [0.209]	3.1 [0.122]	8.2 [0.323]
ABMxE32Z11	15.5 [0.610]	6.3 [0.248]	3.1 [0.122]	10.8 [0.425]
ABMxE42Z11	78°	33°	20°	49°
ABMxE52Z11	78°	33°	20°	49°
ABMxE71Z11	78°	33°	20°	49°
ABMxE92Z11	—	21°	9°	—
ABMxE93Z11	—	21°	21°	—
ABP Series				
ABPxH14Z11	5.9 [0.232]	2.2 [0.867]	1.0 [0.039]	3.8 [0.150]
ABPxH19Z11	10.5 [0.413]	4.6 [0.181]	2.4 [0.094]	7.5 [0.295]
ABPxH35Z11	17 [0.669]	6.8 [0.268]	3.8 [0.150]	11.3 [0.445]
ABPxH41Z11	90°	31°	19°	47°
ABPxH51Z11	90°	31°	19°	47°
ABPxH71Z11	90°	31°	19°	47°
ABPxH92Z11	—	27°	15°	—
ABPxH93Z11	—	27°	15°	—

IEC Limit Switches Accessories

Replacement contact blocks

Easily-installed replacement contact blocks fit both heavy-duty IEC and double-insulated limit switches, including mini-DIN models.

Note: Limit switches come standard with snap-action contacts (AGZ11-SWITCH.) To replace contact block, remove limit switch cover. Carefully remove old contact block and install replacement. Contact blocks are supplied with an adapter to fit into larger ABM and ABP switches. Remove this adapter when installing contacts in mini-DIN AAP models.

Replacement Contact Blocks			
Part Number	*Price*	*Contact Type*	*Action*
AGZ11-SWITCH		Snap-action 1 N.C. and N.O.	3ms change-over time
AGZ02-SWITCH		Snap-action 2 N.C.	3ms change-over time
AGX11-SWITCH		Slow-action 1 N.C. and 1 N.O.	Break before make
AGY11-SWITCH		Slow-action overlay 1 N.C. and 1 N.O.	Make before break
AGW02-SWITCH		Slow-action delay 2 N.C.	Simultaneous
AGW20-SWITCH		Slow-action overlay 2 N.O.	Simultaneous

Additional lever arms, spare parts and accessories for ABM series

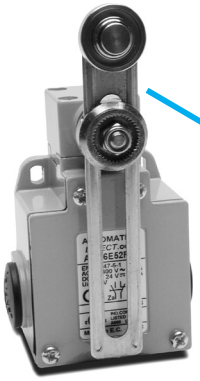
Additional Lever Arms/Spare Parts and Accessories			
Part Number	*Price*	*Drawing Link*	*Actuator Type*
AGE42-LEVER		PDF	Lever with stainless steel roller for E42 models (replacement lever)
AGE44-LEVER		N/A	Lever with 50mm diameter rubber roller (fits E42 models)
AGE52-LEVER		PDF	Lever with stainless steel roller for E52 models (replacement lever)
AGE54-LEVER		PDF	Lever with 50mm diameter rubber roller (fits E52 models)

Note: See the Bar Charts page of this section for more information.

Replacement actuator levers for heavy-duty IEC models

Easily-replaceable actuators for E42 and E52 model limit switches.

Note: These models have an E42 or E52 in the part number, for example, ABM1E42Z11.



AGE52-LEVER

(Replacement lever shown installed on ABM5E52Z11 limit switch)

AGE44-LEVER

AGE54-LEVER