

# IEC Limit Switches

## Plastic Housing Stainless Steel Spring Actuator AAP Series

- Small body allows mounting in tight spaces
- Double insulated PBT housing
- Single conduit opening PG11 with 1/2" NPT adapter or 5-pin M12 quick-disconnect
- 1 N.O. and 1 N.C. contact on all units
- Snap-action (Z11) contacts

**Compact Limit Switches With Plastic Enclosure With Connector AAP Series Selection Chart**

Part Number	Price		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
<a href="#"><u>AAP2T93Z11</u></a>	\$14.50		360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	PG11 threads with a 1/2-inch NPT adapter
<a href="#"><u>AAP7T93Z11</u></a>	\$18.50		360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	5-pin M12 quick-disconnect (bottom)



### Housing style



PG11 threads with  
1/2-inch NPT adapter

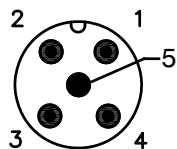


5-pin M12 quick-disconnect  
(bottom)

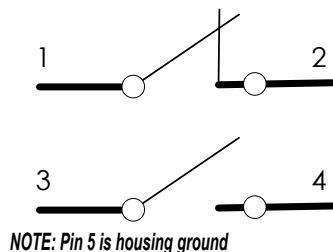
# IEC Limit Switches

## Plastic Housing Stainless Steel Spring Actuator AAP Series

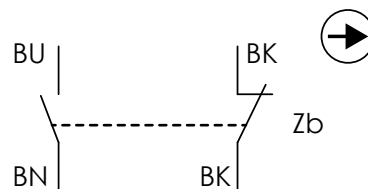
### Connector



### Contact Configuration



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



# IEC Limit Switches Specifications

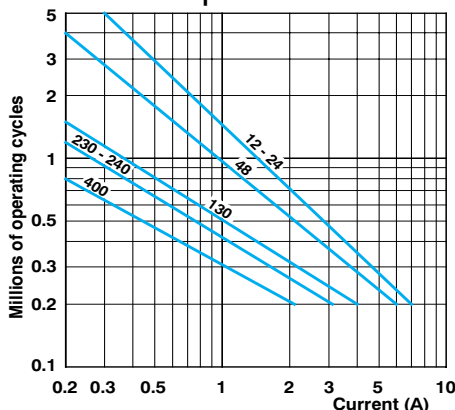
IEC Limit Switches Specifications					
Type		Plastic		Metal	
Environmental					
Degree of Protection		IEC IP65		IEC IP66	
Temperature Range <sup>1</sup>		Stocking: -30 to 80°C [-22 to 176° F] Working: -25 to 70°C [-13 to 158°F]		Stocking: -30 to 80°C [-22 to 176°F] Working: -10 to 70°C [14 to 158°F];	
Rated Insulation Voltage		690V (degree of pollution 3)			
Mechanical Ratings					
Working Positions <sup>2</sup>		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 <sup>3</sup>		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 <sup>4</sup> With slow-action contacts: 500mm [19.685 in] per minute <sup>5</sup>			
Rated Insulation Voltage		660V			
Terminals Marking		According to CENELEC EN 50013			
Wiring Connections		2 x 2.5mm² (AWG14) to 2 x 0.5mm² (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.

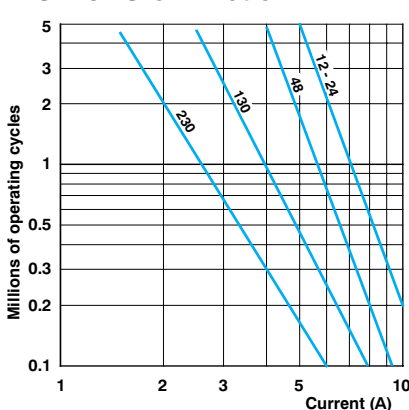
# Limit Switches Supplemental

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

### AC-15 Snap Action



### AC-15 Slow Action



#### 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.

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

### Terminal Markings

European	
Terminal No.	Type
11-12	N.C. contact of pole no. 1 <sup>1</sup>
13-14	N.O. contact of pole no. 2 <sup>1</sup>
21-22	N.C. contact of pole no. 2 <sup>2</sup>
23-24	N.O. contact of pole no. 1 <sup>2</sup>

<sup>1</sup> With non-isolated contacts    <sup>2</sup> With isolated contacts

*Note: Green/yellow wire is physical earth ground.*



**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)

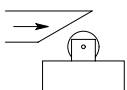


Diagram in millimeters/cam travel

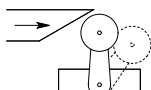
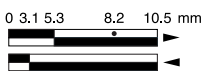


Diagram in degrees/lever rotation

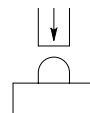
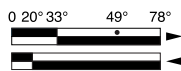
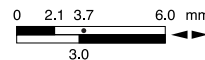


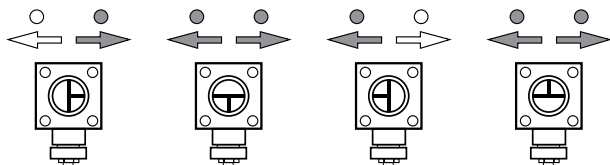
Diagram in millimeters/plunger travel



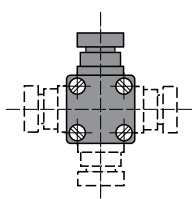
## Changeable working heads (E42, E52, E71)

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

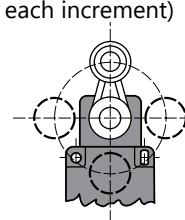
To change position, push in and twist until it locks into place



Positioning - 90° each way

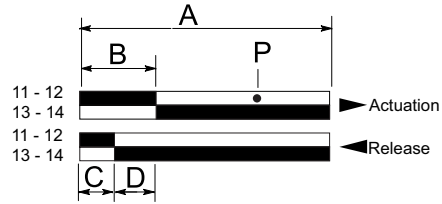
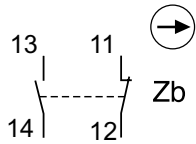


Adjustable lever from 0-360°  
(6° each increment)



## 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
<b>AEM Halogen</b>				
<b>AEM2G12Z11-HF1</b>	8.7 [0.343]	3.8 [0.150]	2.4 [0.095]	7.5 [0.295]
<b>AEM2G16Z11-HF1</b>	5 [0.197]	2.2 [0.867]	1.4 [0.055]	4.3 [0.169]
<b>AEM2G42Z11-HF1</b>	74°	32°	21°	65°
<b>AEM2G51Z11-HF1</b>	74°	32°	21°	65°
<b>AEM2G71Z11-HF1</b>	74°	32°	21°	65°
<b>AEM2G93Z11-HF1</b>	—	10°	20°	—
<b>AAM Series</b>				
<b>AAMxF11Z11x</b>	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
<b>AAMxF12Z11x</b>	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
<b>AAMxT14Z11x</b>	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
<b>AAMxT35Z11x</b>	21 [0.827]	9 [0.354]	4.5 [0.177]	14.5 [0.571]
<b>AAMxF43Z11x</b>	74°	31°	17°	47°
<b>AAMxF46Z11x</b>	74°	31°	17°	47°
<b>AAMxF53Z11x</b>	74°	31°	17°	47°
<b>AAMxF71Z11x</b>	74°	31°	17°	47°
<b>AAMxT93Z11x</b>	—	12°	23°	—
<b>AAP Series</b>				
<b>AAPxT10Z11x</b>	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
<b>AAPxT13Z11x</b>	9.6 [0.378]	4.7 [0.185]	2.5 [0.098]	7.6 [0.299]
<b>AAPxT14Z11x</b>	5.6 [0.220]	2.5 [0.098]	1.3 [0.051]	4.1 [0.161]
<b>AAPxT35Z11x</b>	21 [0.827]	9 [0.354]	4.5 [0.177]	14.5 [0.571]
<b>AAPxT41Z11x</b>	74°	31°	17°	47°
<b>AAPxT42Z11x</b>	74°	31°	17°	47°
<b>AAPxT45Z11x</b>	74°	31°	17°	47°
<b>AAPxT51Z11x</b>	74°	31°	17°	47°
<b>AAPxT5100Z11x</b>	74°	31°	17°	47°
<b>AAPxT5200Z11x</b>	74°	31°	17°	47°
<b>AAPxT71Z11x</b>	74°	31°	17°	47°
<b>AAPxT93Z11x</b>	—	12°	23°	—

Contact Displacement Values tables continued on next page



# IEC Limit Switches Bar Charts

## Contacts Configuration and Bar Charts

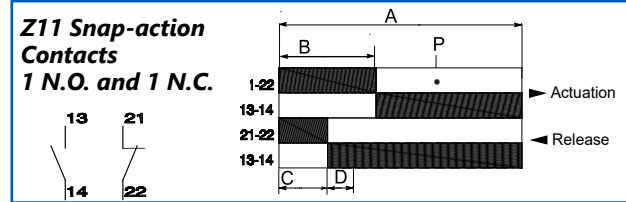
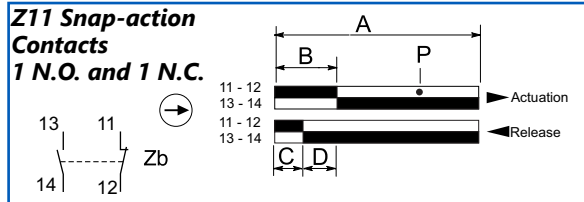
A = Max. travel of the operator in mm or degrees

B = Tripping travel of both contacts on actuation

C = Tripping travel of both contacts on release

D = Differential travel (between actuation and release)

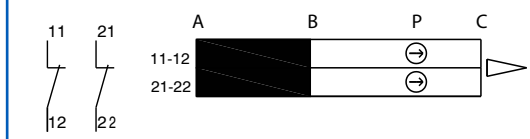
P = Point from which positive opening is assured during actuation



Contact Displacement Values				
Part Series	Displacement Values (mm [in] or degrees)			
	A	B	C	P
<b>ABMxE11Z11</b>	6.0 [0.24]	3.0 [0.12]	1.8 [0.07]	4.6 [0.18]
<b>ABMxE13Z11</b>	10.5 [0.41]	5.3 [0.21]	3.1 [0.12]	8.2 [0.32]
<b>ABMxE32Z11</b>	15.5 [0.61]	6.3 [0.25]	3.1 [0.12]	10.8 [0.43]
<b>ABMxE42Z11</b>	78°	33°	20°	49°
<b>ABMxE52Z11</b>	78°	33°	20°	49°
<b>ABMxE71Z11</b>	78°	33°	20°	49°
<b>ABMxE92Z11</b>	—	21°	9°	—
<b>ABMxE93Z11</b>	—	21°	21°	—
<b>ABPxH14Z11</b>	5.9 [0.23]	2.2 [0.09]	1.0 [0.04]	3.8 [0.15]
<b>ABPxH19Z11</b>	10.5 [0.41]	4.6 [0.18]	2.4 [0.09]	7.5 [0.30]
<b>ABPxH35Z11</b>	17 [0.67]	6.8 [0.27]	3.8 [0.15]	11.3 [0.44]
<b>ABPxH41Z11</b>	90°	31°	19°	47°
<b>ABPxH51Z11</b>	90°	31°	19°	47°
<b>ABPxH71Z11</b>	90°	31°	19°	47°
<b>ABPxH92Z11</b>	—	27°	15°	—
<b>ABPxH93Z11</b>	—	27°	15°	—

Contact Displacement Values				
Part Number	Displacement Values (mm [in] or degrees)			
	A	B	C	P
<b>ADP2T13Z11</b>	9.6 [0.37]	4.7 [0.19]	2.5 [0.10]	7.6 [0.29]
<b>ADP2T14Z11</b>	5.6 [0.22]	2.5 [0.10]	1.3 [0.05]	4.1 [0.16]
<b>ADP2T35Z11</b>	21 [0.82]	9.0 [0.35]	4.9 [0.19]	14.5 [0.57]
<b>ADP2T41Z11</b>	74°	31°	17°	47°
<b>ADP2T45Z11</b>	74°	31°	17°	47°
<b>ADP2T51Z11</b>	74°	31°	17°	47°
<b>ADP2T5100Z11</b>	74°	31°	17°	47°
<b>ADP2T71Z11</b>	74°	31°	17°	47°
<b>ADM2F11Z11</b>	5.6 [0.22]	2.5 [0.10]	1.3 [0.05]	4.1 [0.16]
<b>ADM2F12Z11</b>	9.6 [0.37]	4.7 [0.19]	2.5 [0.10]	7.6 [0.29]
<b>ADM2T35Z11</b>	21 [0.82]	9.0 [0.35]	4.9 [0.19]	14.5 [0.57]
<b>ADM2F43Z11</b>	74°	31°	17°	47°
<b>ADM2F46Z11</b>	74°	31°	17°	47°
<b>ADM2F53Z11</b>	74°	31°	17°	47°
<b>ADM2F71Z11</b>	74°	31°	17°	47°
<b>ADM2T93Z11</b>	23°	23°	12°	—
<b>ADM2T9805Z11A</b>	5.6 [0.22]	2.0 [0.07]	0.9 [0.03]	—

**J02 Snap-action Contacts**  
**2 N.C.**



Contact Displacement Values				
Part Number	Displacement Values (mm [in] or degrees)			
	A	B	C	P
<b>AHP2R002J02-024</b>	—	2.4 [0.09]		4 [0.15]
<b>AHP2T11J02-024</b>	—	2.4 [0.09]		4 [0.15]
<b>AHP2T12J02-024</b>	—	4.5 [0.17]		7.4 [0.29]
<b>AHP2T30J02-024</b>	—	8.6 [0.33]		13.1 [0.51]
<b>AHP2T32J02-024</b>	—	8.6 [0.33]		13.1 [0.51]
<b>AHP2T41J02-024</b>	—	30°		46°
<b>AHP2T5100J02-024</b>	—	30°		46°
<b>AHP2T5200J02-024</b>	—	30°		46°



# Limit Switches Supplemental

## Contact Displacement Values (continued)

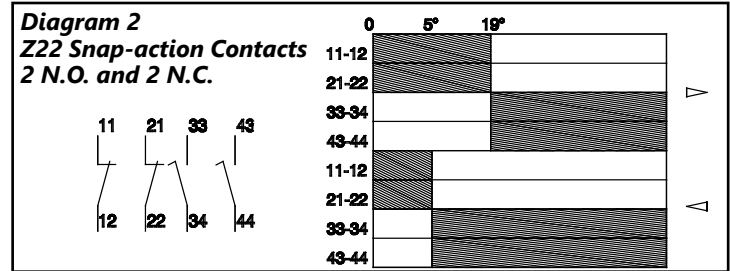
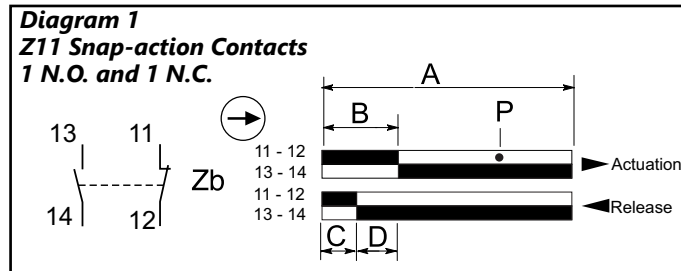
A = Max. travel of the operator in mm or degrees

B = Tripping travel of the N.C. contact

C = Tripping travel of the N.O. contact

D = Differential travel (between actuation and release)

P = Point from which positive opening is assured during actuation



Contact Displacement Values					
Part Series	Contact Configuration	Displacement Values mm [in] or degrees			
		A	B	C	P
AEP2G11	Z11	5.0 [0.20]	2.2 [0.09]	1.4 [0.06]	4.3 [0.17]
AEP2G11	Z22	5.0 [0.20]	2.1 [0.82]	1.3 [0.05]	4.0 [0.16]
AEP2G12	Z11	8.7 [0.34]	3.8 [0.15]	2.2 [0.09]	7.5 [0.30]
AEP2G12	Z22	8.7 [0.34]	3.8 [0.15]	2.3 [0.09]	7.0 [0.27]
AEP2G16	Z11	5.0 [0.20]	2.2 [0.09]	1.4 [0.06]	4.3 [0.17]
AEP2G16	Z22	5.0 [0.20]	2.1 [0.82]	1.3 [0.05]	4.0 [0.16]
AEP2G21	Z22	5.0 [0.20]	2.1 [0.82]	1.3 [0.05]	4.0 [0.16]
AEP2G22	Z22	8.7 [0.34]	3.8 [0.14]	2.3 [0.09]	7.0 [0.27]
AEP2G41	Z11	74°	32°	21°	65°
AEP2G41	Z22	75°	30°	10°	55°
AEP2G42	Z11	74°	32°	21°	65°
AEP2G43	Z11	74°	32°	21°	65°
AEP2G51	Z11	74°	32°	21°	65°
AEP2G51	Z22	75°	30°	10°	55°
AEP2G71	Z11	74°	32°	21°	65°
AEP2G92	Z11	—	20°	10°	—
AEP2G93	Z11	—	20°	10°	—
AEP2G93	Z22	—	19°	5°	—

# 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
<a href="#">AGZ11-SWITCH</a>	\$7.00	Snap action (1) N.O. and (1) N.C.	3ms change-over time
<a href="#">AGZ02-SWITCH</a>	\$6.50	Snap action (2) N.C.	3ms change-over time
<a href="#">AGX11-SWITCH</a>	\$6.50	Slow action (1) N.O. and (1) N.C.	Break before make
<a href="#">AGY11-SWITCH</a>	\$6.50	Slow action overlay (1) N.O. and (1) N.C.	Make before break
<a href="#">AGW02-SWITCH</a>	\$7.25	Slow action delay (2) N.C.	Simultaneous
<a href="#">AGW20-SWITCH</a>	\$5.00	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
<a href="#">AGE42-LEVER</a>	\$6.50	<a href="#">PDF</a>	Lever with stainless steel roller for E42 models (replacement lever)
<a href="#">AGE44-LEVER</a>	\$6.50	N/A	Lever with 50mm diameter rubber roller (fits E42 models)
<a href="#">AGE52-LEVER</a>	\$8.00	<a href="#">PDF</a>	Lever with stainless steel roller for E52 models (replacement lever)
<a href="#">AGE54-LEVER</a>	\$8.00	<a href="#">PDF</a>	Lever with 50mm diameter rubber roller (fits E52 models)

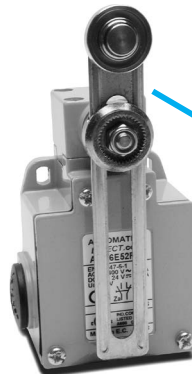
**Note:** See the Bar Charts page of this section for more information.



### 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

