IEC Limit Switches

AAM Series Metal Housing (Plunger 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
AAM2F11Z11		PDF	Metal plunger	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	1/2-in NPT cable entry
AAM7F11Z11		PDF	Metal plunger	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	5-pin M12 quick-disconnect (bottom)
AAM2F12Z11		PDF	Metal plunger with metal roller	0.3 [0.98]	12N [2.70 lbf]	30N [6.74 lbf]	1/2-in NPT cable entry
AAM7F12Z11		PDF	Metal plunger with metal roller	0.3 [0.98]	12N [2.70 lbf]	30N [6.74 lbf]	5-pin M12 quick-disconnect (bottom)
AAM2T14Z11		PDF	Metal plunger with dust cap	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	1/2-in NPT cable entry
AAM7T14Z11		PDF	Metal plunger with dust cap	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	5-pin M12 quick-disconnect (bottom)
AAM2T35Z11		PDF	One-way horizontal lever with nylon roller	1 [3.28]	7N [1.57 lbf]	24N [5.40 lbf]	1/2-in NPT cable entry
AAM7T35Z11		PDF	One-way horizontal lever with nylon roller	1 3.28]	7N [1.57 lbf]	24N [5.40 lbf]	5-pin M12 quick-disconnect (bottom)

Housing style

AAM2F11Z11

AAM2F12Z11

AAM2T14Z11

AAM2T35Z11
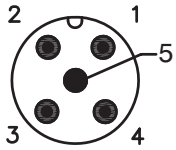

1/2-in NPT cable entry

5-pin M12 quick-disconnect (bottom)
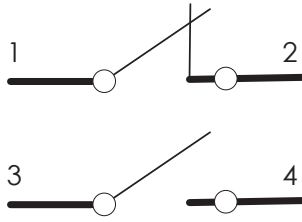
IEC Limit Switches
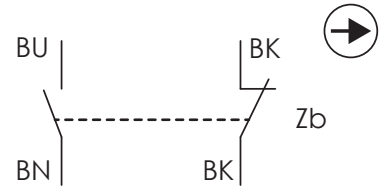
AAM Series Metal Housing (Plunger Actuator)

Connector

Contact Configuration

1   2

3   4

NOTE: Pin 5 is housing ground

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

BU   BK

BN   BK   Zb

IEC Limit Switches Specifications

IEC Limit Switches Specifications		
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	$2 \times 2.5mm^2$ (AWG14) to $2 \times 0.5mm^2$ (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.
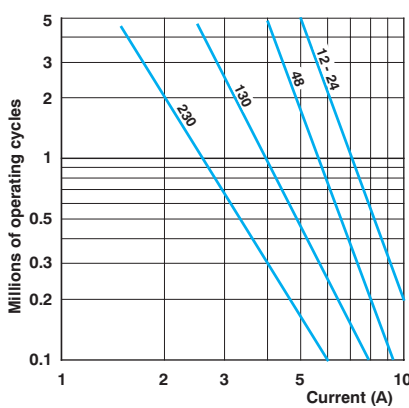
Limit Switches Supplemental

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

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

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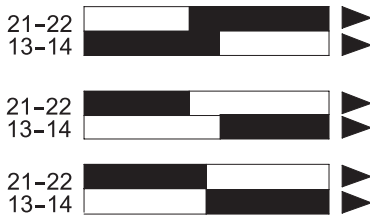
_1-_2 is N.C., _3-_4 is N.O.
so 11-12, 21-22 are N.C., while 13-14, 23-24 are N.O.

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)
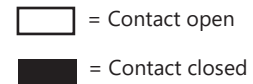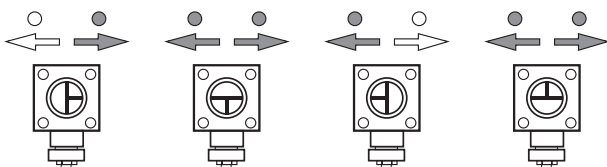
Bar Chart Examples
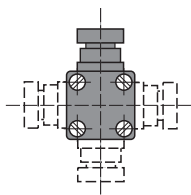 **(cam angle is 30 degrees)**
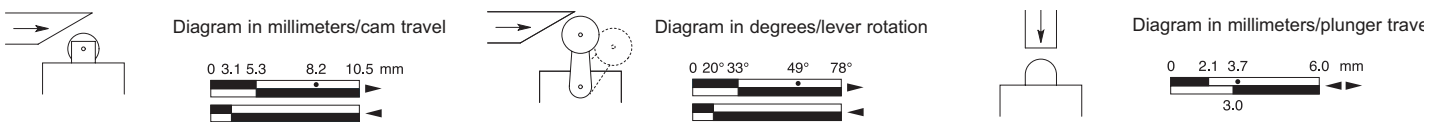
Changeable working heads (E42, E52, E71)

View of cam insert when looking at bottom of head once removed from switch body.
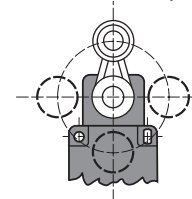
To change position, push in and twist

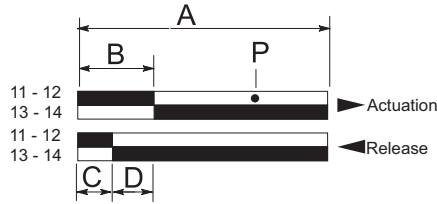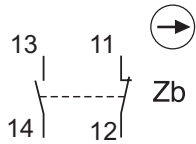until it locks into place

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

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°	—
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°	—

Achieve™ 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)

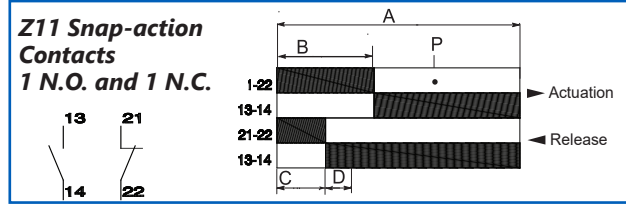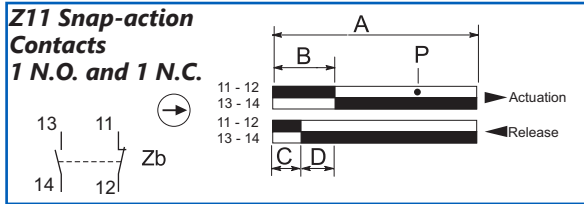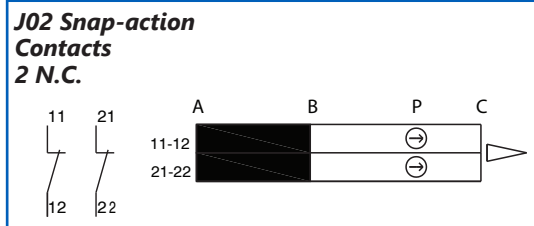P = Point from which positive opening is assured during actuation

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

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

Contact Displacement Values

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

Contact Displacement Values

Part Number	Displacement Values (mm [in] or degrees)			
	A	B	C	P
ADP2T13Z11	9.6 [0.37]	4.7 [0.19]	2.5 [0.10]	7.6 [0.29]
ADP2T14Z11	5.6 [0.22]	2.5 [0.10]	1.3 [0.05]	4.1 [0.16]
ADP2T35Z11	21 [0.82]	9.0 [0.35]	4.9 [0.19]	14.5 [0.57]
ADP2T41Z11	74º	31º	17º	47º
ADP2T45Z11	74º	31º	17º	47º
ADP2T51Z11	74º	31º	17º	47º
ADP2T5100Z11	74º	31º	17º	47º
ADP2T71Z11	74º	31º	17º	47º
ADM2F11Z11	5.6 [0.22]	2.5 [0.10]	1.3 [0.05]	4.1 [0.16]
ADM2F12Z11	9.6 [0.37]	4.7 [0.19]	2.5 [0.10]	7.6 [0.29]
ADM2T35Z11	21 [0.82]	9.0 [0.35]	4.9 [0.19]	14.5 [0.57]
ADM2F43Z11	74º	31º	17º	47º
ADM2F46Z11	74º	31º	17º	47º
ADM2F53Z11	74º	31º	17º	47º
ADM2F71Z11	74º	31º	17º	47º
ADM2T93Z11	23º	23º	12º	—
ADM2T9805Z11A	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
AHP2R002J02-024	—	2.4 [0.09]		4 [0.15]
AHP2T11J02-024	—	2.4 [0.09]		4 [0.15]
AHP2T12J02-024	—	4.5 [0.17]		7.4 [0.29]
AHP2T30J02-024	—	8.6 [0.33]		13.1 [0.51]
AHP2T32J02-024	—	8.6 [0.33]		13.1 [0.51]
AHP2T41J02-024	—	30º		46º
AHP2T5100J02-024	—	30º		46º
AHP2T5200J02-024	—	30º		46º

Achieve™ Limit Switches Supplemental

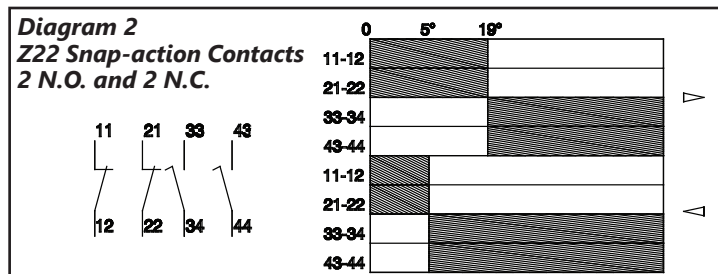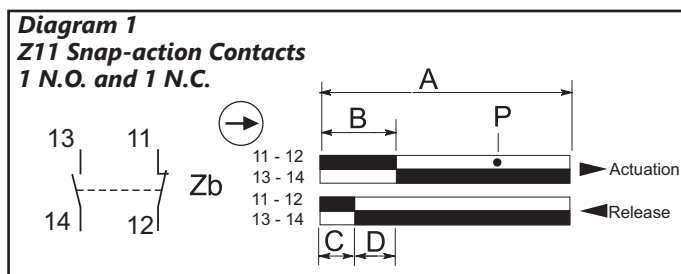## Contact Displacement Values (continued)

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

Diagram 1
Z11 Snap-action Contacts
1 N.O. and 1 N.C.

Diagram 2
Z22 Snap-action Contacts
2 N.O. and 2 N.C.

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**
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.

AGE44-LEVER
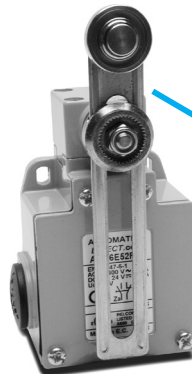
AGE52-LEVER

(Replacement lever shown installed on ABM5E52Z11 limit switch)

AGE54-LEVER