

IEC Limit Switches

Plastic Housing Plunger 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 | 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 |
|----------------------------|----------|---------------------|--|-------------------------------------|--|---|--|
| AAP2T10Z11 | \$;4atz: | PDF | Plastic plunger | 0.5 [1.64] | 15N [3.37 lbf] | 30N [6.74 lbf] | PG11 threads with 1/2-inch NPT adapter |
| AAP2T13Z11 | \$087s: | PDF | Galvanized steel plunger with polyamide plastic roller | 0.3 [0.98] | 12N [2.70 lbf] | 30N [6.74 lbf] | PG11 threads with 1/2-inch NPT adapter |
| AAP7T13Z11 | \$;4at.: | PDF | Galvanized steel plunger with polyamide plastic roller | 0.3 [0.98] | 12N [2.70 lbf] | 30N [6.74 lbf] | 5-pin M12 quick-disconnect (bottom) |
| AAP2T14Z11 | \$087o: | PDF | Metal plunger with dust cap | 0.5 [1.64] | 15N [3.37 lbf] | 30N [6.74 lbf] | PG11 threads with 1/2-inch NPT adapter |
| AAP2T35Z11 | \$087k: | PDF | One-way horizontal lever with polyamide roller | 1.0 [3.28] | 7N [1.57 lbf] | 24N [5.40 lbf] | PG11 threads with 1/2-inch NPT adapter |
| AAP7T35Z11 | \$4au1: | PDF | One-way horizontal lever with polyamide roller | 1.0 [3.28] | 7N [1.57 lbf] | 24N [5.40 lbf] | 5-pin M12 quick-disconnect (bottom) |

Housing style



[AAP7T10Z11](#)



[AAP7T13Z11](#)



[AAP7T14Z11](#)



[AAP7T35Z11](#)



PG11 threads with 1/2-inch NPT adapter

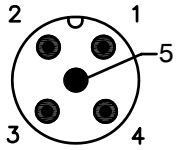


5-pin M12 quick- disconnect (bottom)

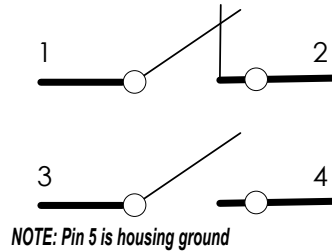
IEC Limit Switches

Plastic Housing Plunger Actuator AAP Series

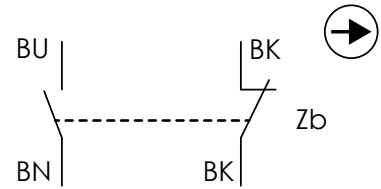
Connector



Contact Configuration



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



IEC Limit Switches Specifications

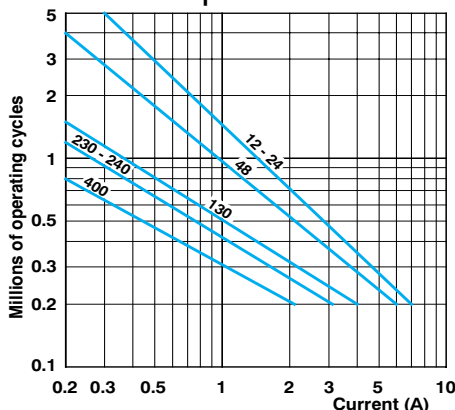
| IEC Limit Switches Specifications | | | | | |
|--|------|--|--|--|--|
| Type | | Plastic | | Metal | |
| Environmental | | | | | |
| Degree of Protection | | IEC IP65 | | IEC IP66 | |
| Temperature Range ¹ | | Stocking: -30 to 80°C [-22 to 176° F] Working: -25 to 70°C [-13 to 158°F] | | Stocking: -30 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 2.5mm² (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.

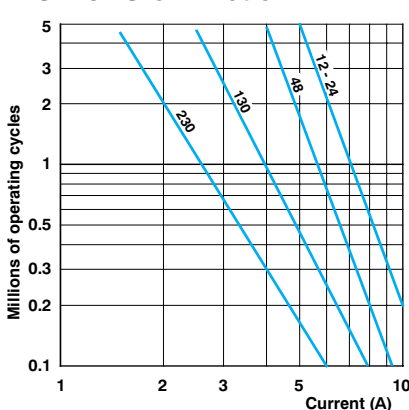
Limit Switches Supplemental

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 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.



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)

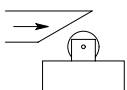


Diagram in millimeters/cam travel

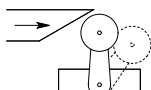
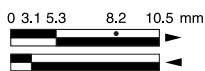


Diagram in degrees/lever rotation

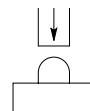
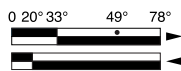
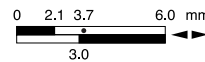


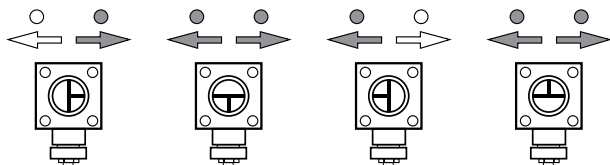
Diagram in millimeters/plunger travel



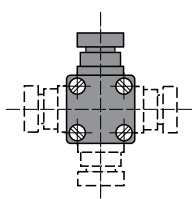
Changeable working heads (E42, E52, E71)

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

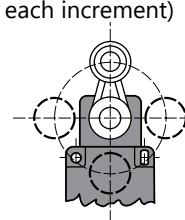
To change position, push in and twist until it locks into place



Positioning - 90° each way

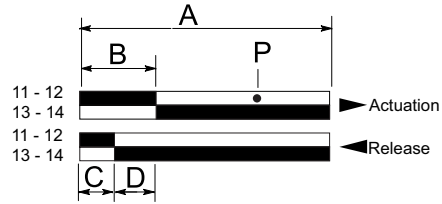
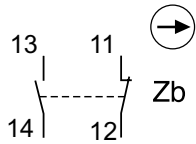


Adjustable lever from 0-360°
(6° each increment)



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 |
| 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° | — |

Contact Displacement Values tables continued on next page



IEC Limit Switches Bar Charts

Contacts Configuration and Bar Charts

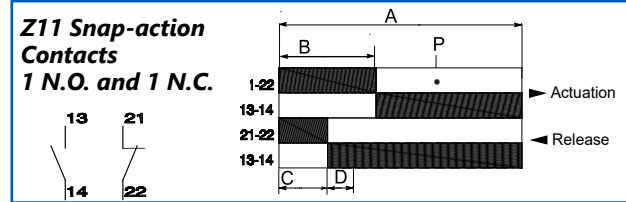
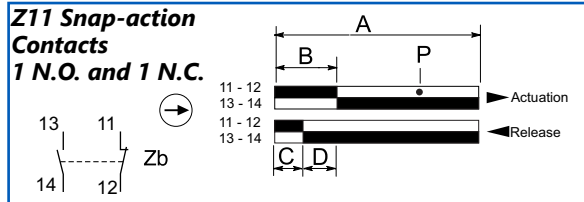
A = Max. travel of the operator in mm or degrees

B = Tripping travel of both contacts on actuation

C = Tripping travel of both contacts on release

D = Differential travel (between actuation and release)

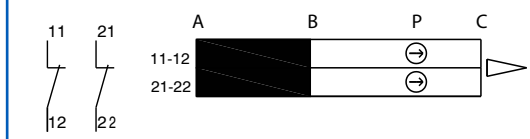
P = Point from which positive opening is assured during actuation



| Contact Displacement Values | | | | |
|-----------------------------|--|------------|------------|-------------|
| Part Series | Displacement Values (mm [in] or degrees) | | | |
| | A | B | C | P |
| 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 | 78° | 33° | 20° | 49° |
| ABMxE52Z11 | 78° | 33° | 20° | 49° |
| ABMxE71Z11 | 78° | 33° | 20° | 49° |
| ABMxE92Z11 | — | 21° | 9° | — |
| ABMxE93Z11 | — | 21° | 21° | — |
| 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 | 90° | 31° | 19° | 47° |
| ABPxH51Z11 | 90° | 31° | 19° | 47° |
| ABPxH71Z11 | 90° | 31° | 19° | 47° |
| ABPxH92Z11 | — | 27° | 15° | — |
| ABPxH93Z11 | — | 27° | 15° | — |

| 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 | 74° | 31° | 17° | 47° |
| ADP2T45Z11 | 74° | 31° | 17° | 47° |
| ADP2T51Z11 | 74° | 31° | 17° | 47° |
| ADP2T5100Z11 | 74° | 31° | 17° | 47° |
| ADP2T71Z11 | 74° | 31° | 17° | 47° |
| 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 | 74° | 31° | 17° | 47° |
| ADM2F46Z11 | 74° | 31° | 17° | 47° |
| ADM2F53Z11 | 74° | 31° | 17° | 47° |
| ADM2F71Z11 | 74° | 31° | 17° | 47° |
| ADM2T93Z11 | 23° | 23° | 12° | — |
| 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 | — | 30° | | 46° |
| AHP2T5100J02-024 | — | 30° | | 46° |
| AHP2T5200J02-024 | — | 30° | | 46° |



Limit Switches Supplemental

Contact Displacement Values (continued)

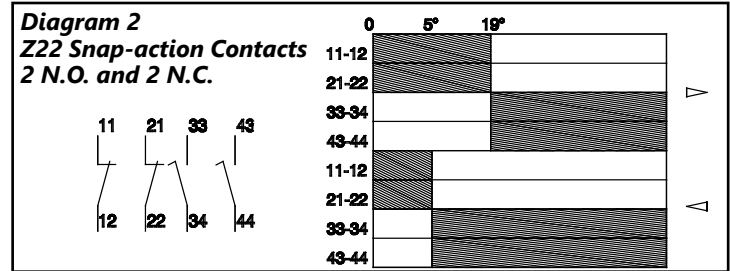
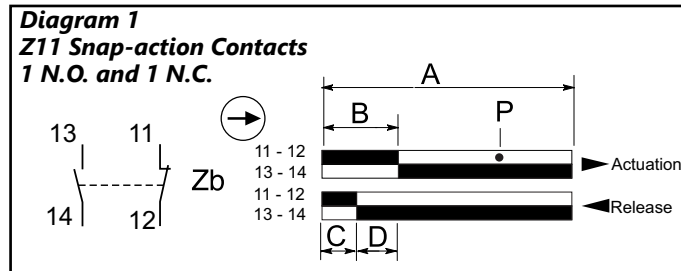
A = Max. travel of the operator in mm or degrees

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 |
| AGZ11-SWITCH | \$88c: | Snap action (1) N.O. and (1) N.C. | 3ms change-over time |
| AGZ02-SWITCH | \$88b: | Snap action (2) N.C. | 3ms change-over time |
| AGX11-SWITCH | \$889: | Slow action (1) N.O. and (1) N.C. | Break before make |
| AGY11-SWITCH | \$88a: | Slow action overlay (1) N.O. and (1) N.C. | Make before break |
| AGW02-SWITCH | \$887: | Slow action delay (2) N.C. | Simultaneous |
| AGW20-SWITCH | \$888: | 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 | \$883: | PDF | Lever with stainless steel roller for E42 models (replacement lever) |
| AGE44-LEVER | \$884: | N/A | Lever with 50mm diameter rubber roller (fits E42 models) |
| AGE52-LEVER | \$885: | PDF | Lever with stainless steel roller for E52 models (replacement lever) |
| AGE54-LEVER | \$886: | PDF | Lever with 50mm diameter rubber roller (fits E52 models) |

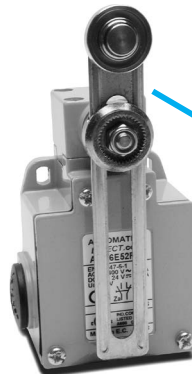
Note: See the Bar Charts page of this section for more information.



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

