## Anatomy of a Limit Switch

## NEMA Versus IEC Limit Switches

The primary difference between NEMA and IEC is the robustness of the switch AND it's cost. In many extreme applications, such as heavy machinery, foundries, or even mining, the performance of a NEMA limit switch is an absolute must. However, a NEMA limit switch is typically over twice the price of an IEC limit switch, and in many applications, such as material handling, or ASRS (automated storage and retrieval systems), an IEC limit switch will perform very well and will save you money. So remember, take a close look at your application needs and choose the
most cost effective limit switch for your needs.
How long does a limit switch last?
Limit switches are involved in physical contact applications that cause wear and tear on the switch. We recognize this concern and supply only the highest quality, longest lasting limit switches.
In addition, don't be fooled by specifications on the mechanical life of a limit switch. Typically, the electrical life of the contact block is the limiting factor in the overall life of a limit switch. Because of
this, we offer replacement contact blocks for as little as $\$ 4.25$. You shouldn't have to pay a lot to maintain your system.
(Note: The compact series and the Eaton NEMA limit switches have non-replaceable contacts blocks)
In evaluating the specification, you will find that the AutomationDirect limit switch has an astounding mechanical life of 30 million operations, while the electrical life is an incredible 5 million operations. Compare this to some competitors' specifications and you'll see the AutomationDirect advantage.


IEC model shown. Features of the other limit switch series may vary.

## Limit Switches Selection Guide



| Series | F25 Series | ABM Series | ABP Series |
| :---: | :---: | :---: | :---: |
| Description | Eaton NEMA Limit Switches | Heavy duty IEC | Double-insulated, non-metallic IEC |
| Material | Die-Cast Zinc Alloy | Aluminum | PBT (plastic) |
| Degree of Protection (IEC529) | IEC IP67 | IEC IP66 | IEC IP65 |
| Maximum Switching Frequency | 8000 operations per hour | Contact blocks: all two cycles per second | Contact blocks: all two cycles per second |
| Mechanical Service Life | Side rotary: 13 million operations minimum Side and Top Push: 10 million operations minimum <br> Wobble: 10 million operations minimum | 25 million cycles | 25 million cycles |
| Contact Configuration | SPDT, DPDT snap-acting | One snap-action set of N.O. / N.C. contacts. (Optional contact blocks with other configurations are available) | One snap-action set of N.O. / N.C. contacts. (Optional contact blocks with other configurations are available) |
| Conduit Opening | $1 / 2$ in NPT | One and three cable holes, PG 13.5 or 1/2 NPT | One cable hole, PG 13.5 or 1/2 NPT |
| Connection | AWG \#12 through \#18 AWG wire | $2 \times 2.5 \mathrm{~mm}^{2}$ (AWG14) to $2 \times 0.5 \mathrm{~mm}^{2}$ (AWG 18) | $2 \times 2.5 \mathrm{~mm}^{2}$ (AWG14) to $2 \times 0.5 \mathrm{~mm}^{2}$ (AWG 18) |
| Agency Approvals | F25Axx versions are CE-approved; All versions cULus. | CE markings for applicable CE Directives UL certified (UL508), File E191072. RoHS | CE markings for applicable CE Directives UL certified (UL508), File E191072. RoHS |



| Series | AAP Series | AEM Series | Precision Series |
| :--- | :---: | :---: | :---: |
| Description | Double-insulated, non-metallic mini-DIN IEC | Compact 25mm mount | Precision touch |
| Material | PBT (plastic) | Zinc Alloy | Stainless Steel |
| Degree of Protection (IEC529) | IEC IP65 | IEC IP67 | IEC IP40 to IP67, depending on model |
| Maximum Switching <br> Frequency | Contact blocks: all two cycles per second | Contact blocks: all one cycle per second |  |
| Mechanical Service Life | 25 million cycles | 5 million or 10 million cycles, <br> depending on model | 1 million to 10 million cycles, |
| depending on model |  |  |  |

## Eaton NEMA Limit Switches

## F25 Series NEMA Limit Switches

- 9 side rotary heads available
-90-degree adjustable head. Levers are adjustable to any angle on the operating shaft.
- Die-cast zinc housing for industrial applications
- Fully assembled out of box
- SPDT and DPDT snap action configurations available
- $1 / 2$ inch NPT conduit opening
- Contact patterns similar to those of leading competitors

| F25 Serics NEMA Limit Swhtches |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Snap Action Contacts | Travel to Operate Contacts | Total <br> Travel | Force to Operate Contacts | Photo |
| Side Rotary |  |  |  |  |  |  |  |  |
| F25ASRL200 | \$155.00 | PDF | 1.5 inch stainless steel lever with Nylatron roller | (1) N.O./(1) N.C. | $5^{\circ}$ | $90^{\circ}$ | $\begin{gathered} 3 \mathrm{lb} \cdot \mathrm{in} \\ {[0.34 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ |  |
| F25BSRL200 | \$191.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL355 | \$155.00 | PDF | 1.5 inch stainless steel lever with metal roller | (1) N.O./(1) N.C. |  |  |  | B |
| F25BSRL355 | \$191.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL549 | \$170.00 | PDF | 2 inch stainless steel lever with metal roller | (1) N.O./(1) N.C. |  |  |  | C |
| F25BSRL549 | \$206.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL551 | \$171.00 | PDF | 3 inch stainless steel lever with metal roller | (1) N.O./(1) N.C. |  |  |  | D |
| F25BSRL551 | \$207.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL548 | \$171.00 | PDF | 3 inch stainless steel lever with Nylatron roller | (1) N.O./(1) N.C. |  |  |  | E |
| F25BSRL548 | \$207.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL539 | \$177.00 | PDF | Adjustable stainless steel lever with ball bearing roller | (1) N.O./(1) N.C. |  |  |  | F |
| F25BSRL539 | \$212.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL201 | \$170.00 | PDF | Side rotary adjustable stainless steel lever with Nylatron roller | (1) N.O./(1) N.C. |  |  |  | G |
| F25BSRL201 | \$206.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL421 | \$170.00 | PDF | Adjustable spring stainless steel rod | (1) N.O./(1) N.C. |  |  |  | H |
| F25BSRL421 | \$206.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASRL142 | \$170.00 | PDF | 6 inch Nylatron loop | (1) N.O./(1) N.C. |  |  |  | I |
| F25BSRL142 | \$206.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |



## Eaton NEMA Limit Switches

## F25 Series NEMA Limit Switches

- 12 push and 6 wobble heads available
- 90-degree adjustable head
- Die-cast zinc housing for industrial applications
- Fully assembled out of box
- SPDT and DPDT snap action configurations available
- 1/2 in NPT conduit opening
- Contact patterns similar to those of leading competitors

| F25 Series NEMA Limit Switches |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Snap Action Contacts | Travel to Operate Contacts | Total Travel | Force to Operate Contacts | Photo |
| Side Push |  |  |  |  |  |  |  |  |
| F25ASP1 | \$161.00 | PDF | Side metal plunger | (1) N.O./(1) N.C. | $\begin{gathered} 0.065 \mathrm{in} \\ {[1.651 \mathrm{~mm}]} \end{gathered}$ | $\begin{gathered} 0.290 \mathrm{in} \\ {[7.366 \mathrm{~mm}]} \end{gathered}$ | $\begin{gathered} { }_{[1.81 \mathrm{bg}} \end{gathered}$ |  |
| F25BSP1 | \$204.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  | A |
| F25ASP2 | \$183.00 | PDF | Side metal plunger adjustable | (1) N.O./(1) N.C. |  |  |  | B |
| F25BSP2 | \$224.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ASP3 | \$183.00 | PDF | Side metal plunger with metal roller | (1) N.O./(1) N.C. |  |  |  | c |
| F25BSP3 | \$219.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| Top Push |  |  |  |  |  |  |  |  |
| F25ATP1 | \$146.00 | PDF | Metal plunger | (1) N.O./(1) N.C. | $\begin{gathered} 0.040 \mathrm{in} \\ {[1.00 \mathrm{~mm}]} \end{gathered}$ | $\begin{gathered} 0.280 \mathrm{in} \\ {[7.366 \mathrm{~mm}]} \end{gathered}$ | $\begin{gathered} { }_{[1.81 \mathrm{bg}]} \end{gathered}$ |  |
| F25BTP1 | \$192.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| F25ATP2 | \$183.00 | PDF | Metal plunger adjustable | (1) N.O./(1) N.C. |  |  |  | E |
| F25BTP2 | \$224.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  | E |
| F25ATP3 | \$161.00 | PDF | Metal plunger with metal roller | (1) N.O./(1) N.C. |  |  |  |  |
| F25BTP3 | \$204.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  |  |
| Wobble Head |  |  |  |  |  |  |  |  |
| F25AW2 | \$143.00 | PDF | 360 degree nylon rod | (1) N.O./(1) N.C. | $10^{\circ}$ | $15^{\circ}$ | $\begin{gathered} 2 \mathrm{lb} \cdot \mathrm{in} \\ {[1.23 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ |  |
| F25BW2 | \$209.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  | G |
| F25AW3 | \$143.00 | PDF | 360 degree stainless steel rod | (1) N.O./(1) N.C. |  |  |  | H |
| F25BW3 | \$209.00 | PDF |  | (2) N.O./(2) N.C. |  |  |  | H |
| F25AW4 | \$146.00 | PDF | 360 degree stainless steel spring | (1) N.O./(1) N.C. |  |  |  |  |
| F25BW4 | \$209.00 | PDF |  | (2) N.O./(2) N.C.. |  |  |  |  |



## Eaton NEMA Limit Switches <br> Specifications

F25 Series NEMA Limit Switches Specifications

| Environmental |  |
| :---: | :---: |
| Degree of Protection | NEMA 3, 3S, 4, 4X, 6, 6P, 13 IP67 |
| Temperature Range | Side Rotary $10^{\circ} \mathrm{F}\left[-12^{\circ} \mathrm{C}\right]$ to $200^{\circ} \mathrm{F}\left[94^{\circ} \mathrm{C}\right]$ Side Push $14^{\circ} \mathrm{F}\left[-10^{\circ} \mathrm{C}\right]$ to $200^{\circ} \mathrm{F}\left[94^{\circ} \mathrm{C}\right]$ Wobble $14^{\circ} \mathrm{F}\left[-10^{\circ} \mathrm{C}\right]$ to $250^{\circ} \mathrm{F}\left[121^{\circ} \mathrm{C}\right]$ |
| Mechanical Ratings |  |
| Repeat Accuracy | Side Operated: Within 0.0012 in. [ 0.0305 mm ] Side Push: Within 0.003 in. [0.076 mm] Top Push: Within 0.002 in. [ 0.051 mm ] |
| Mechanical Life | Side Rotary: 13 million operations minimum Side and Top Push: 10 million operations minimum Wobble: 10 million operations minimum |
| Conduit Entrance | $1 / 2$ in NPT |
| Enclosure Material | Die-cast zinc alloy |
| Contact Blocks Rating |  |
| Contact Rating | NEMA A600 R300 |
| Electrical Ratings AC <br>  DC <br> Maximum Switching Frequency  | Make: 60 A at $120 \mathrm{VAC} ; 30 \mathrm{~A}$ at $240 \mathrm{VAC} ; 15 \mathrm{~A}$ at $480 \mathrm{VAC} ; 12 \mathrm{~A}$ at 600 VAC Break: 6 A at $120 \mathrm{VAC} ; 3 \mathrm{~A}$ at $240 \mathrm{VAC} ; 1.5 \mathrm{~A}$ at $480 \mathrm{VAC} ; 1.2 \mathrm{~A}$ at 600 VAC Continuous: 10A at 480VAC |
|  | Make: 0.25 A at 120VDC; 0.125 A at 240VDC |
|  | 8000 operations per hour |
| Electrical Life | Single Pole: 1,000,000 operations typical at full load Double Pole: 100,000 operations typical at full load |
| Wiring Connections | AWG \#12 through \#18 AWG Wire |
| Torque Requirements | Switch Body Screws 25-30 in-lb [2.8-3.4 N•m] Operating Head Screws $14-18$ in-lb [1.6-2.0 N•m] |
| Agency Approvals * | cULus 170645 all versions <br> F25Ax versions have CE, All units are Reach compliant |

*To obtain the most current agency approval information, see the Agency Compliance \& Certifications Checklist section on the specific part number's web page.

## Connection Diagram

Connection diagram - SPDT, DPDT
The following connection diagram appears on the switch body nameplate.


## (8) 5CHmER5RL IEC Limit Switches

## 235 Series Metal Body Limit Switches

## Features

- 16 models available
- 90-degree adjustable head, levers are adjustable to any angle on the operating shaft
- Die-Cast Zinc enclosure
- Fully assembled out of box
- Snap-action with constant contact pressure up to switching point
- M20 x 1.5 to $1 / 2^{\prime \prime}$ NPT conduit adapter
- Contact patterns similar to those of leading competitors

| Schmersal 235 Series Metal Body Limit Switches |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Actuator Type | Snap Action Contacts | Travel to Operate Contacts | Total <br> Travel | Actuating Force (min) | Switch Travel Diagram | Drawing Link * |
| ZS-235-02Z | \$28.00 | Metal plunger | (2) N.C. | 0.07 in [ 1.8 mm ] | $\begin{aligned} & 0.24 \mathrm{in} \\ & {[6 \mathrm{~mm}]} \end{aligned}$ | 79.66 lb -in [ $9 \mathrm{~N} \cdot \mathrm{~m}$ ] | Diagram 1 | PDF |
| ZS-235-11Z | \$28.00 |  | (1) N.O./(1) N.C. | 0.1 in [2.5 mm] |  |  | Diagram 2 | PDF |
| ZR-235-02Z | \$30.00 | Metal plunger with plastic roller | (2) N.C. | 0.07 in [ 1.8 mm ] |  |  | Diagram 1 | PDF |
| ZR-235-11Z | \$30.00 |  | (1) N.O./(1) N.C. | 0.1 in [2.5 mm] |  |  | Diagram 2 | PDF |
| $\underline{\text { Z4S-235-02Z }}$ | \$34.50 | metal plunger with fixing nuts M | (2) N.C. | 0.07 in [ 1.8 mm ] |  |  | Diagram 1 | PDF |
| Z4S-235-11Z | \$34.50 |  | (1) N.O./(1) N.C. | 0.1 in [2.5 mm] |  |  | Diagram 2 | PDF |
| Z4R-235-02Z | \$37.50 | Metal plunger with plastic roller with fixing nuts | (2) N.C. | 0.07 in [ 1.8 mm ] |  |  | Diagram 1 | PDF |
| Z4R-235-11Z | \$37.50 |  | (1) N.O./(1) N.C. | 0.1 in [2.5 mm] |  |  | Diagram 2 | PDF |
| ZV12H-235-02Z | \$42.50 | Side rotary lever with plastic roller | (2) N.C. | $22^{\circ}$ | $70^{\circ}$ | $\begin{gathered} 1.33 \mathrm{lb}-\mathrm{in} \\ {[0.15 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ | Diagram 3 | PDF |
| ZV12H-235-11Z | \$42.50 |  | (1) N.O./(1) N.C. |  |  |  | Diagram 3 | PDF |
| ZK-235-02Z | \$31.00 | One-way horizontal lever with plastic roller | (2) N.C. | 0.1 in [2.5 mm] | $\begin{gathered} 0.37 \mathrm{in} \\ {[9.3 \mathrm{~mm}]} \end{gathered}$ | 79.66 lb-in [ $9 \mathrm{~N} \cdot \mathrm{~m}$ ] | Diagram 5 | PDF |
| ZK-235-11Z | \$31.00 |  | (1) N.O./(1) N.C. | 0.14 in [ 3.6 mm ] |  |  | Diagram 6 | PDF |
| ZV7H-235-02Z | \$46.00 | Side rotary adjustable lever with plastic roller | (2) N.C. | $22^{\circ}$ | $70^{\circ}$ | $1.33 \mathrm{lb}-\mathrm{in}$ [0.15 N•m] | Diagram 7 | PDF |
| ZV7H-235-11Z | \$46.00 |  | (1) N.O./(1) N.C. | $30^{\circ}$ |  |  | Diagram 8 | PDF |
| ZV10H-235-02Z | \$44.50 | Side rotary adjustable 6 mm plastic rod | (2) N.C. | $22^{\circ}$ | $70^{\circ}$ |  | Diagram 7 | PDF |
| ZV10H-235-11Z | \$44.50 |  | (1) N.O./(1) N.C. | $30^{\circ}$ |  |  | Diagram 8 | PDF |

* Weights are included on the drawing


ZS-236-02Z


ZV12H-235-02Z


ZR-235-02Z


ZK-235-02Z


Z4S-235-02Z


ZV7H-235-02Z


Z4R-235-02Z


## (8) 5LHmER5RL IEC Limit Switches

## 236 Series Plastic Body Limit Switches

## Features

- 16 models available
- 90-degree adjustable head, levers are adjustable to any angle on the operating shaft
- Double-insulated thermoplastic enclosure
- Fully assembled out of box
- Snap-action with constant contact pressure up to switching point
- M20 x 1.5 to $1 / 2^{\prime \prime}$ NPT conduit adapter
- Contact patterns similar to those of leading competitors

| Schmersal 236 Series Thermoplastic Body Limit Switches |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Actuator Type | Snap Action Contacts | Travel to Operate Contacts | Total Travel | Actuating Force (min) | Switch Travel Diagram | Drawing Link * |
| ZS-236-02Z | \$14.50 |  | (2) N.C. | 0.07 in [ 1.8 mm ] | $\begin{aligned} & 0.24 \mathrm{in} \\ & {[6 \mathrm{~mm}]} \end{aligned}$ | $79.66 \mathrm{lb}-\mathrm{in}$ [9 N•m] | Diagram 1 | PDF |
| ZS-236-11Z | \$14.50 |  | (1) N.O./(1) N.C. | 0.1 in [2.5 mm] |  |  | Diagram 2 | PDF |
| ZR-236-02Z | \$16.50 | Metal plunger with plastic roller | (2) N.C. | 0.07 in [ 1.8 mm ] |  |  | Diagram 1 | PDF |
| ZR-236-11Z | \$16.50 |  | (1) N.O./(1) N.C. | 0.1 in [ 2.5 mm ] |  |  | Diagram 2 | PDF |
| Z4S-236-02Z | \$27.00 | Metal plunger with fixing nuts | (2) N.C. | 0.07 in [ 1.8 mm ] |  |  | Diagram 1 | PDF |
| Z4S-236-11Z | \$27.00 |  | (1) N.O./(1) N.C. | 0.1 in [2.5 mm] |  |  | Diagram 2 | PDF |
| Z4R-236-02Z | \$30.00 | Metal plunger with plastic roller with fixing nuts | (2) N.C. | 0.07 in [ 1.8 mm ] |  |  | Diagram 1 | PDF |
| Z4R-236-11Z | \$30.00 |  | (1) N.O./(1) N.C. | 0.1 in [2.5 mm] |  |  | Diagram 2 | PDF |
| ZV12H-236-02Z | \$28.00 | Side rotary lever with plastic roller | (2) N.C. | $22^{\circ}$ | $70^{\circ}$ | $\begin{gathered} 1.33 \mathrm{lb}-\mathrm{in} \\ {[0.15 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ | Diagram 3 | PDF |
| ZV12H-236-11Z | \$28.00 |  | (1) N.O./(1) N.C. |  |  |  | Diagram 3 | PDF |
| ZK-236-02Z | \$20.00 | One-way horizontal lever with plastic roller | (2) N.C. | 0.1 in [2.5 mm] | $\begin{gathered} 0.37 \mathrm{in} \\ {[9.3 \mathrm{~mm}]} \end{gathered}$ | 79.66 lb-in [ $9 \mathrm{~N} \cdot \mathrm{~m}$ ] | Diagram 5 | PDF |
| ZK-236-11Z | \$20.00 |  | (1) N.O./(1) N.C. | 0.14 in [ 3.6 mm ] |  |  | Diagram 6 | PDF |
| ZV7H-236-02Z-2138 | \$31.00 | Side rotary adjustable lever with plastic roller | (2) N.C. | $22^{\circ}$ | $70^{\circ}$ | $\begin{gathered} 1.33 \mathrm{lb}-\mathrm{in} \\ {[0.15 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ | Diagram 3 | PDF |
| ZV7H-236-11Z-2138 | \$31.00 |  | (1) N.O./(1) N.C. | $30^{\circ}$ |  |  | Diagram 4 | PDF |
| ZV10H-236-02Z | \$30.00 | Side rotary adjustable 6 mm plastic rod | (2) N.C. | $22^{\circ}$ | $70^{\circ}$ |  | Diagram 7 | PDF |
| ZV10H-236-11Z | \$30.00 |  | (1) N.O./(1) N.C. | $30^{\circ}$ |  |  | Diagram 8 | PDF |

* Weights are included on the drawing


ZS-236-02Z


ZV12H-236-02Z


ZR-236-02Z


ZK-236-02Z


Z4S-236-02Z


ZV7H-236-02Z-2138


Z4R-236-02Z


ZV10H-236-02Z

## Switch Travel Diagrams



Diagram 4


Diagram 7


Diagram 5


## Contact Travel Diagrams



Diagram 1


Diagram 2

## (8) 5CHMER5RL 235/236 Series Specifications

| Schmersal 235/236 Scries Specifications |  |  |
| :---: | :---: | :---: |
| Series | 235 | 236 |
| Environmental |  |  |
| Degree of Protection | IP67 |  |
| Temperature Range | -30 to $80^{\circ} \mathrm{C}\left[-22\right.$ to $\left.176^{\circ} \mathrm{F}\right]$ |  |
| Mechanical Ratings |  |  |
| Body Footprint (Without Actuator Head) | $30 \times 30 \times 63.5 \mathrm{~mm}$ | $30 \times 30 \times 58.5 \mathrm{~mm}$ |
| Mechanical Life | 20 Million Operations |  |
| Conduit Entrance | M20 $\times 1.5$, each unit comes with a $1 / 2$ in NPT adapter |  |
| Enclosure Material | Die-cast zinc alloy | Plastic, Glass-fiber reinforced thermoplastic, self-extinguishing |
| Contact Blocks Rating |  |  |
| Rated Impulse Withstand Voltage |  | 6 kV |
| Electrical Ratings AC | AC-15-4A @ 230VACContinuous: 10A @ 230VACRequired rated short-circuit current to EN60947-5-1: 1,000A |  |
| DC | DC-13-1A@ 24VDC |  |
| Maximum Switching Frequency | 5,000 operations per hour, Switchover time: Max 5.5 ms , Bounce Duration: Max 3ms |  |
| Contact Type | Change-over contact with double break, type 1 N.C. or 2 N.C. contacts, with galvanically separated contact bridges: snap-action, N.C. contacts with positive break |  |
| Wiring Connections | AWG \#14 through AWG \#18 Wire |  |
| Torque Requirements | Wiring Terminals: $7.1 \mathrm{in-lb}$ [ $0.8 \mathrm{~N} \cdot \mathrm{~m}$ ] |  |
| Safety Data |  |  |
| General | $02 Z$ Series - Safety Function, Yes: Number of Safety Contacts: 2 <br> $11 Z$ Series - Safety Function, Yes, Number of Safety Contacts 1, Number of Aux Contacts 1 |  |
| Safety Appraisal | Standards: ISO 13849-1, Mission Time 20 Year(s) <br> Safety Outputs: B10d Normally-closed contact (N.C.), 20,000,000 Operations |  |
| Agency Approvals* | cULus E57648 all versions. All units are CE and Reach Compliant Standards: IEC 60947-5-1 : 2010, ISO 13849-1, BG-GS-ET-15, ISO 13849-1 |  |

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## (8) 5СHmER5RL IEC Limit Switches

## 335 Series Metal Body Limit Switches

## Features

- 9 Models available
-90-degree adjustable head. Levers are adjustable to any angle on the operating shaft
- Aluminum enclosure
- Fully assembled out of box
- Snap-action with constant contact pressure up to switching point
- M20 x 1.5 to 1/2" NPT conduit adapter
- Contact patterns similar to those of leading competitors

| Schmersal 335 Series Metal Body Limit Switches |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Actuator Type | Snap Action Contacts | Travel to Operate Contacts | Total Travel | Actuating Force (min) | Switch Travel Diagram | Drawing Link * |
| ZS-335-11Z | \$52.00 | Metal plunger | (1) N.O./(1) N.C. | $\begin{gathered} 0.8 \mathrm{in} \\ {[2.0 \mathrm{~mm}]} \end{gathered}$ | $\begin{aligned} & 0.24 \mathrm{in} \\ & {[6 \mathrm{~mm}]} \end{aligned}$ | $\begin{aligned} & 106.2 \mathrm{lb}-\mathrm{in} \\ & {[12 \mathrm{~N} \cdot \mathrm{~m}]} \end{aligned}$ | Diagram 1 | PDF |
| ZR-335-11Z | \$54.00 | Metal plunger with plastic roller | (1) N.O./(1) N.C. |  |  |  |  | PDF |
| Z4VH-335-02Z | \$72.00 | Side rotary lever with plastic roller | (2) N.C. | $19^{\circ}$ | $80^{\circ}$ | $2.3 \mathrm{lb}-\mathrm{in}$ [ $0.26 \mathrm{~N} \cdot \mathrm{~m}$ ] | Diagram 2 | PDF |
| Z4VH-335-11Z | \$72.00 |  | (1) N.O./(1) N.C. | $24^{\circ}$ |  |  | Diagram 3 | PDF |
| Z1K-335-11Z | \$66.00 | One-way horizontal lever with plastic roller | (1) N.O./(1) N.C. | $\begin{gathered} 0.82 \mathrm{in} \\ {[2.1 \mathrm{~mm}]} \end{gathered}$ | $\begin{gathered} 0.25 \mathrm{in} \\ {[6.3 \mathrm{~mm}]} \\ \hline \end{gathered}$ | $\begin{aligned} & 106.2 \mathrm{lb}-\mathrm{in} \\ & {[12 \mathrm{~N} \cdot \mathrm{~m}]} \\ & \hline \end{aligned}$ | Diagram 4 | PDF |
| Z4V7H-335-02Z | \$72.00 | Side rotary adjustable lever with plastic roller | (2) N.C. | $19^{\circ}$ | $80^{\circ}$ | $\begin{gathered} 1.33 \mathrm{lb}-\mathrm{in} \\ {[0.15 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ | Diagram 5 | PDF |
| Z4V7H-335-11Z | \$72.00 |  | (1) N.O./(1) N.C. | $24^{\circ}$ |  |  | Diagram 6 | PDF |
| Z4V10H-335-02Z | \$72.00 | Side rotary adjustable 6 mm plastic rod | (2) N.C. | $19^{\circ}$ |  |  | Diagram 5 | PDF |
| Z4V10H-335-11Z | \$72.00 |  | (1) N.O./(1) N.C. | $24^{\circ}$ |  |  | Diagram 6 | PDF |

* Weights are included on the drawing


ZS-335-11Z


Z1K-335-11Z


ZR-335-11Z


Z4V7H-335-02Z


Z4VH-335-02Z


Z4V10H-335-02Z

## (8) 5CHmER5RL IEC Limit Switches

## 336 Series Plastic Body Limit Switches

## Features

- 9 models available
- 90-degree adjustable head, levers are adjustable to any angle on the operating shaft
- Double-insulated Thermoplastic enclosure
- Fully assembled out of box
- Snap-action with constant contact pressure up to switching point
- M20 x 1.5 to 1/2" NPT conduit adapter
- Contact patterns similar to those of leading competitors

| Schmersal 336 Series Plastic Body Limit Switches |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Actuator Type | Snap Action Contacts | Travel to Operate Contacts | Total Travel | Actuating Force (min) | Switch Travel Diagram | Drawing Link * |
| ZS-336-11Z | \$22.00 | Metal plunger | (1) N.O./(1) N.C. | $\begin{gathered} 0.08 \mathrm{in} \\ {[2.0 \mathrm{~mm}]} \end{gathered}$ | $\begin{aligned} & 0.24 \mathrm{in} \\ & {[6 \mathrm{~mm}]} \end{aligned}$ | $\begin{aligned} & 106.2 \mathrm{lb}-\mathrm{in} \\ & {[12 \mathrm{~N} \cdot \mathrm{~m}]} \end{aligned}$ | Diagram 1 | PDF |
| ZR-336-11Z | \$28.00 | Metal plunger with plastic roller | (1) N.O./(1) N.C. |  |  |  |  | PDF |
| Z4VH-336-02Z | \$36.50 | Side rotary lever with plastic roller | (2) N.C. | $19^{\circ}$ | $80^{\circ}$ | $\begin{gathered} 2.3 \mathrm{lb}-\mathrm{in} \\ {[0.26 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ | Diagram 2 | PDF |
| Z4VH-336-11Z | \$36.50 |  | (1) N.O./(1) N.C. | $24^{\circ}$ |  |  | Diagram 3 | PDF |
| Z1K-336-11Z | \$41.50 | One-way horizontal lever with plastic roller | (1) N.O./(1) N.C. | $\begin{gathered} 0.82 \mathrm{in} \\ {[2.1 \mathrm{~mm}]} \end{gathered}$ | $\begin{gathered} 0.25 \mathrm{in} \\ {[6.3 \mathrm{~mm}]} \end{gathered}$ | $\begin{gathered} 106.2 \mathrm{lb}-\mathrm{in} \\ {[12 \mathrm{~N} \cdot \mathrm{~m}]} \end{gathered}$ | Diagram 4 | PDF |
| Z4V7H-336-02Z | \$36.50 | Side rotary adjustable lever with plastic roller | (2) N.C. | $19^{\circ}$ | $80^{\circ}$ | $1.33 \mathrm{lb}-\mathrm{in}$ [ $0.15 \mathrm{~N} \cdot \mathrm{~m}$ ] | Diagram 5 | PDF |
| Z4V7H-336-11Z | \$36.50 |  | (1) N.O./(1) N.C. | $24^{\circ}$ |  |  | Diagram 6 | PDF |
| Z4V10H-336-02Z | \$34.50 | Side rotary adjustable 6 mm plastic rod | (2) N.C. | $19^{\circ}$ |  |  | Diagram 5 | PDF |
| Z4V10H-336-11Z | \$34.50 |  | (1) N.O./(1) N.C. | $24^{\circ}$ |  |  | Diagram 6 | PDF |

*Weights are included on the drawing



Z1K-336-11Z


Z4V7H-336-02Z

Z4VH-336-02Z


Z4V10H-336-02Z

## (S) 5CHTMER5RL 335/336 Series Travel Diagrams

## Switch Travel Diagrams



Diagram 1


Diagram 4

## Contact Travel Diagrams



Diagram 1


Diagram 2


Diagram 5


Diagram 3


Diagram 6


Diagram 2

## (8) 5LHmER5RL 335/336 Series Specifications

| Schmersal 335/336 Serics Specifications |  |  |
| :---: | :---: | :---: |
| Series | 335 | 336 |
| Environmental |  |  |
| Degree of Protection | IP67 |  |
| Temperature Range | -30 to $80^{\circ} \mathrm{C}\left[-22\right.$ to $\left.176^{\circ} \mathrm{F}\right]$ |  |
| Mechanical Ratings |  |  |
| Body Footprint (Without Actuator Head) | $40.5 \mathrm{~mm} \times 38 \mathrm{~mm} \times 66.5 \mathrm{~mm}$ |  |
| Mechanical Life | 30 Million Operations |  |
| Conduit Entrance | M20 x 1.5, each unit comes with a $1 / 2$ in NPT adapter |  |
| Enclosure Material | Aluminum | Plastic, Glass-fiber reinforced thermoplastic, selfextinguishing |
| Contact Blocks Rating |  |  |
| Rated Impulse Withstand Voltage | 6 kV |  |
| Electrical Ratings $\quad$ AC | AC-15-4A @ 230VACContinuous: 10A @ 230VACRequired rated short-circuit current to EN60947-5-1: 1,000A |  |
| $D C$ | DC-13-4A@ 24VDC |  |
| Maximum Switching Frequency | 5,000 operations per hour, Switchover time: Max 2ms, Bounce Duration, in accordance with actuating speed |  |
| Contact Type | Change-over contact with double break, type 1 N.C. or 2 N.C. contacts, with galvanically separated contact bridges: snap-action, <br> N.C. contacts with positive break |  |
| Wiring Connections | AWG \#14 through AWG \#18 Wire |  |
| Torque Requirements | Wiring Terminals: $7.1 \mathrm{in}-\mathrm{lb}$ [0.8 N•m] |  |
| Safety Data |  |  |
| General | $02 Z$ Series - Safety Function, Yes: Number of Safety Contacts: 2 <br> $11 Z$ Series - Safety Function, Yes, Number of Safety Contacts 1, Number of Aux Contacts 1 |  |
| Safety Appraisal | Standards: ISO 13849-1, Mission Time 20 Year(s) Safety Outputs: B10d Normally-closed contact (N.C.), 20,000,000 Operations |  |
| Agency Approvals* | cULus E5 Standar | are CE and Reach Compliant SO 13849-1, BG-GS-ET-15 |

*To obtain the most current agency approval information, see the Agency Compliance \& Certifications Checklist section on the specific part number's web page.

# (8) 5LHmER5RL Compact Limit Switches 

## PS116 Series Compact Limit Switches

## Features

- Metal top with thermoplastic body
- 1 N.O. and 1 N.C. contact on all units
- $45^{\circ}$ adjustable head
- Lever angle models adjustable $15^{\circ}$ steps
- IP66, IP67


PS116Z11-STRR200

| Ps116 Serios Compact Limit Switches |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link and Weights | Action | Actuator Type | Min. Actuating Speed mm/min | Max. Actuating Speed m/s | Switch <br> Travel / Contact Diagram | Connection Type |
| PS116Z11-L200S200 | \$37.00 | PDF | Snap | Plastic plunger | 10 | 0.5 | 2/2 | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail,bottom exit |
| PS116Z11-LR200S200 | \$37.00 | PDF |  |  |  |  | 2/2 | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, right exit |
| PS116Z11-STS200 | \$37.00 | PDF |  |  |  |  | 2/2 | 4-pin M12 quick-disconnect, bottom exit |
| PS116Z11-STRS200 | \$37.00 | PDF |  |  |  |  | $2 / 2$ | 4-pin M12 quick-disconnect, right exit |
| PS116T11-L200S200 | \$37.00 | PDF | Slow action break before make |  | 60 |  | $4 / 1$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, bottom exit |
| PS116T11-STRS200 | \$37.00 | PDF |  |  |  |  | $4 / 1$ | 4-pin M12 quick-disconnect, right exit |
| PS116Z11-LR200R200 | \$43.00 | PDF | Snap | Plunger with plastic roller | 10 |  | $2 / 2$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, right exit |
| PS116Z11-L200R200 | \$43.00 | PDF |  |  |  |  | 2/2 | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail,bottom exit |
| PS116Z11-STR200 | \$43.00 | PDF |  |  |  |  | $2 / 2$ | 4-pin M12 quick-disconnect, bottom exit |
| PS116Z11-STRR200 | \$43.00 | PDF |  |  |  |  | $2 / 2$ | 4-pin M12 quick-disconnect, right exit |
| PS116T11-L200R200 | \$43.00 | PDF | Slow action break before make |  | 60 |  | $4 / 1$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, bottom exit |
| PS116T11-STRR200 | \$43.00 | PDF |  |  |  |  | $4 / 1$ | 4-pin M12 quick-disconnect, right exit |
| PS116Z11-L200H200 | \$45.00 | PDF | Snap | Side rotary lever with plastic roller | 10 | 1 | $1 / 2$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, bottom exit |
| PS116Z11-LR200H200 | \$45.00 | PDF |  |  |  |  | $1 / 2$ | 6.5 ft 2 m pigtail, right exit |
| PS116Z11-STH200 | \$45.00 | PDF |  |  |  |  | $1 / 2$ | 4-pin M12 quick-disconnect, bottom exit |
| PS116Z11-STRH200 | \$45.00 | PDF |  |  |  |  | 1/2 | 4-pin M12 quick-disconnect, right exit |
| PS116T11-L200H200 | \$45.00 | PDF | Slow action break before make |  | 60 |  | $3 / 1$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, bottom exit |
| PS116T11-STRH200 | \$45.00 | PDF |  |  |  |  | $3 / 1$ | 4-pin M12 quick-disconnect, right exit |
| PS116Z11-L200N200 | \$49.00 | PDF | Snap | Side rotary adjustable lever with plastic roller | 10 |  | $1 / 2$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, bottom exit |
| PS116Z11-LR200N200 | \$49.00 | PDF |  |  |  |  | 1/2 | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, right exit |
| PS116Z11-STN200 | \$49.00 | PDF |  |  |  |  | $1 / 2$ | 4-pin M12 quick-disconnect, bottom exit |
| PS116Z11-STRN200 | \$49.00 | PDF |  |  |  |  | 1/2 | 4-pin M12 quick-disconnect, right exit |
| PS116T11-L200N200 | \$49.00 | PDF | Slow action break before make |  | 60 |  | $3 / 2$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, bottom exit |
| PS116T11-STRN200 | \$49.00 | PDF |  |  |  |  | 3/- | 4-pin M12 quick-disconnect, right exit |
| PS116Z11-L200J200 | \$49.00 | PDF | Snap | Side rotary adjustable plastic rod | 10 |  | $5 / 2$ | $6.5 \mathrm{ft} / 2 \mathrm{~m}$ pigtail, bottom exit |
| PS116Z11-LR200J200 | \$49.00 | PDF |  |  |  |  |  | 6.5 ft 2 m pigtail, right exit |
| PS116Z11-STJ200 | \$49.00 | PDF |  |  |  |  |  | 4-pin M12 quick-disconnect, bottom exit |

## (8) 5CHmER5RL PS116 Series Compact Limit Switches



PS116Z11-LR200S200


PS116Z11-STH200


PS116Z11-STRN200


| PS116 Scries Compact Limit Switches Specifications |  |  |
| :---: | :---: | :---: |
| Technical Data |  |  |
| Standards |  | IEC 60947-5-1 |
| Degree of Protection |  | IP66, IP67 |
| Protection Rating |  | 11 |
| Degree of Pollution |  | 3 |
| Temperature Range |  | -30 to $80^{\circ} \mathrm{C}\left[-22\right.$ to $\left.176^{\circ} \mathrm{F}\right]$ |
| Mechanical Ratings |  |  |
| Min. Actuating Force |  | 10N |
| Min. Positive Break Force |  | 40N |
| Mechanical Life |  | 10,000,000 operations minimum |
| Enclosure Material |  | Plastic, glass fiber reinforced thermoplastic, zinc die-cast, chromate |
| Electrical Data |  |  |
| Rated Operating Current/Voltage le/Ue | Connecting Cable, 4 core: | 3A/240VAC, 1.5 A 24VDC |
|  | Connector Plug M12 4-pole | 1.5A / 240VAC, 1.5 A 24VDC |
| Rated Impulse Withstand Voltage Uimp | Connecting Cable, 4 core: | 4 kV |
|  | Connector Plug M12 4-pole | 2.5 kV |
| Rated Insulation Voltage Ui | Connecting Cable, 4 core: | 300 V |
|  | Connector Plug M12 4-pole | 300 V |
| Thermal Test Current Ithe | Connecting Cable, 4 core: | 5A |
|  | Connector Plug M12 4-pole | 2.5 A |
| Maximum Fuse Rating |  | $6 \mathrm{AgG} \mathrm{D-fuse}$ |
| Required Short-Circuit Current (EN 60947-5-1) |  | 400A |
| B10D to ISO 13849-1 | N.C. Contact | 20,000,000 |
|  | N.O. Contact (at 10\% ohmic contact load) | 1,000,000 |
| Agency Approvals * |  | UL File E57648, CE |

*To obtain the most current agency approval information, see the Agency Compliance \& Certifications Checklist section on the specific part number's web page.

## (8) 5CHmER5RL PS116 Series Compact Limit Switches

Switch Travel Diagrams



DIAGRAM 4


DIAGRAM 5

## Contact Travel Diagrams

## Slow Action

(3) $\mathrm{BN} 11 \sim 12 \mathrm{PK}$ (4)
(1) $\mathrm{YE} 23 \backsim 24 \mathrm{WH}$ (2)

## DIAGRAM 1

## Snap Action

(3) $\mathrm{BN} 13 \backsim 14$ PK (4)
(1) YE $21 \backsim 22 \mathrm{WH}$ (2)

DIAGRAM 2

## M12 Connector



## IEC Limit Switches

## ABM Series Heavy-duty IEC Limit Switches

- Featuring a die-cast aluminum body for heavy-duty industrial applications
- Single and multiple conduit openings to save wiring time and money when interconnecting several limit switches
- Conduit openings in $1 / 2^{\prime \prime}$ NPT or PG13.5
- Splined actuator shaft allows very fine adjustment of switch to fit all applications
- Choose from eight different actuators including roller levers and plungers

| ABM Serics |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Number of Conduit Holes | Conduit Threads | Max. Actuation Speed (m/s) | Min. Actuation Force (N) Torque ( $N \cdot m$ ) | Min. <br> Positive <br> Opening <br> Force (N) <br> /torque <br> ( $N \cdot m$ ) | Photo |
| ABM1E11Z11 | \$21.00 | PDF | Stainless steel plunger | 1 | PG13.5 | 0.5 | 30N | 45N | A |
| ABM2E11Z11 | \$48.00 | PDF |  | 1 | 1/2" NPT | 0.5 | 30N | 45N | A |
| ABM5E11Z11 | \$46.00 | PDF |  | 3 | PG13.5 | 0.5 | 30N | 45N | B |
| ABM6E11Z11 | \$48.00 | PDF |  | 3 | NPT | 0.5 | 30N | 45 N | B |
| ABM2E13Z11 | \$48.00 | PDF | Stainless steel plunger with roller | 1 | 1/2" NPT | 0.5 | 22N | 40N | C |
| ABM6E13Z11 | \$48.00 | PDF |  | 3 | 1/2" NPT | 0.5 | 22N | 40N | D |
| ABM1E32Z11 | \$46.00 | PDF | One-way lever with stainless steel roller | 1 | PG13.5 | 1.5 | 12N | 40N | E |
| ABM2E32Z11 | \$48.00 | PDF |  | 1 | 1/2" NPT | 1.5 | 12 N | 40N | E |
| ABM5E32Z11 | \$46.00 | PDF |  | 3 | PG13.5 | 1.5 | 12 N | 40 N | F |
| ABM6E32Z11 | \$48.00 | PDF |  | 3 | 1/2" NPT | 1.5 | 12N | 40N | F |
| ABM1E42Z11 | \$48.00 | PDF | Rotary lever with stain. steel roller (See accessories for opt. roller and actuator levers) | 1 | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | G |
| ABM2E42Z11 | \$48.00 | PDF |  | 1 | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | G |
| ABM5E42Z11 | \$48.00 | PDF |  | 3 | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | H |
| ABM6E42Z11 | \$48.00 | PDF |  | 3 | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | H |
| ABM1E52Z11 | \$48.00 | PDF | Adj. rotary lever w/ stainless steel roller (See accessories for opt. roller and actuator levers) | 1 | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | 1 |
| ABM2E52Z11 | \$48.00 | PDF |  | 1 | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | 1 |
| ABM5E52Z11 | \$46.00 | PDF |  | 3 | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | $J$ |
| ABM6E52Z11 | \$48.00 | PDF |  | 3 | NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | $J$ |
| ABM1E71Z11 | \$48.00 | PDF | Adjustable rotary lever w/ stainless steel rod | 1 | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | K |
| ABM2E71Z11 | \$48.00 | PDF |  | 1 | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | K |
| ABM5E71Z11 | \$27.00 | PDF |  | 3 | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | L |
| ABM6E71Z11 | \$48.00 | PDF |  | 3 | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | L |
| ABM1E92Z11 | \$23.50 | PDF | Wobble lever w/ polyamide tip stainless steel spring | 1 | PG13.5 | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | M |
| ABM2E92Z11 | \$48.00 | PDF |  | 1 | 1/2" NPT | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | M |
| ABM6E92Z11 | \$46.00 | PDF |  | 3 | 1/2" NPT | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | N |
| ABM1E93Z11 | \$48.00 | PDF | Wobble lever w/ stainless steel spring | 1 | PG13.5 | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | 0 |
| ABM2E93Z11 | \$48.00 | PDF |  | 1 | 1/2" NPT | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | 0 |
| ABM6E93Z11 | \$48.00 | PDF |  | 3 | 1/2" NPT | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | P |

M


N


A


## IEC Limit Switches

## ABP Series Double Insulated Limit Switches

- Featuring an electrically isolated PBT body for corrosive environments
- Single conduit openings in $1 / 2^{\prime \prime}$ NPT or PG13.5
- Conduit openings splined actuator shaft allows very fine adjustment of switch to fit all applications
- Choose from eight different actuators including roller levers, plungers, and wobble sticks

| ABP Series |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Number of Conduit Holes | Conduit Threads | Max. Actuation Speed ( $m / s$ ) | Min. Actuation Force ( $N$ ) Torque ( $N \cdot m$ ) | Min. Positive Opening Force (N) Torque ( $N \cdot m$ ) | Photo |
| ABP1H14Z11 | \$31.50 | PDF | Galvanized steel plunger | 1 | PG13.5 | 0.5 | 14 N | 40 N | A |
| ABP2H14Z11 | \$32.00 | PDF |  |  | 1/2" NPT | 0.5 | 14 N | 40 N | A |
| ABP1H19Z11 | \$31.50 | PDF | Galvanized steel plunger with roller |  | PG13.5 | 0.5 | 14 N | 40N | B |
| ABP2H19Z11 | \$32.00 | PDF |  |  | 1/2" NPT | 0.5 | 14 N | 40 N | B |
| ABP1H35Z11 | \$32.00 | PDF | One-way lever with polyamide roller |  | PG13.5 | 1.0 | 8 N | 30 N | C |
| ABP2H35Z11 | \$32.00 | PDF |  |  | 1/2" NPT | 1.0 | 8 N | 30 N | C |
| ABP1H41Z11 | \$31.50 | PDF | Side rotary lever with polyamide roller |  | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | D |
| ABP2H41Z11 | \$32.00 | PDF |  |  | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | D |
| ABP1H51Z11 | \$32.00 | PDF | Side rotary adjustable lever with polyamide roller |  | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | E |
| ABP2H51Z11 | \$32.00 | PDF |  |  | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | E |
| ABP1H71Z11 | \$32.00 | PDF | Side rotary with stainless steel rod |  | PG13.5 | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | F |
| ABP2H71Z11 | \$32.00 | PDF |  |  | 1/2" NPT | 1.5 | $0.15 \mathrm{~N} \cdot \mathrm{~m}$ | $0.30 \mathrm{~N} \cdot \mathrm{~m}$ | F |
| ABP1H92Z11 | \$32.00 | PDF | Wobble lever w/ polyamide tip stainless steel spring |  | PG13.5 | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | G |
| ABP2H92Z11 | \$32.00 | PDF |  |  | 1/2" NPT | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | G |
| ABP1H93Z11 | \$32.00 | PDF | Wobble lever w/ stainless steel spring |  | PG13.5 | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | H |
| ABP2H93Z11 | \$32.00 | PDF |  |  | $1 / 2^{\prime \prime}$ NPT | 1.0 | $0.18 \mathrm{~N} \cdot \mathrm{~m}$ | - | H |



## 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 |
| :--- | :---: | :---: | :---: |
| $\boldsymbol{A G Z 1 1 - S W I T C H ~}$ | $\$ 6.25$ | Snap-action 1 N.C. and N.O. | 3ms change-over time |
| $\boldsymbol{A G Z 0 2 - S W I T C H ~}$ | $\$ 6.00$ | Snap-action 2 N.C. | 3ms change-over time |
| $\boldsymbol{A G X 1 1 - S W I T C H ~}$ | $\$ 6.00$ | Slow-action 1 N.C. and 1 N.O. | Break before make |
| $\boldsymbol{A G Y 1 1 - S W I T C H ~}$ | $\$ 6.00$ | Slow-action overlay 1 N.C. and 1 N.O. | Make before break |
| $\boldsymbol{A G W 0 2 - S W I T C H ~}$ | $\$ 6.50$ | Slow-action delay 2 N.C. | Simultaneous |
| $\boldsymbol{A G W 2 0 - S W I T C H ~}$ | $\$ 4.50$ | Slow-action overlay 2 N.O. | Simultaneous |

## Additional Lever Arms, Spare Parts and Accessories for ABM Series

|  | Additional LeVEr Arms/Spare Paris and ACCOSSOriCs |  |  |
| :--- | :---: | :---: | :---: |
| Part Number | Price | Drawing Link |  |
| AGE42-LEVER | $\$ 6.00$ | $\underline{\text { PDF }}$ | Actuator Type |
| AGE44-LEVER | $\$ 6.00$ | N/A | Lever with stainless steel roller for E42 models (replacement lever) |
| AGE52-LEVER | $\$ 7.25$ | $\underline{\text { PDF }}$ | Lever with 50mm diameter rubber roller (fits E42 models) |
| AGE54-LEVER | $\$ 7.25$ | $\underline{\text { PDF }}$ | Lever with stainless steel roller for E52 models (replacement lever) |

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


## Achie $\backslash{ }^{\prime \prime \prime}$ IEC Limit Switches

## ADP Series Plastic 50mm IEC Limit Switches

-90-degree adjustable head, levers are adjustable $10^{\circ}$ on the operating shaft

- Snap-action contacts 1 N.O. and 1 N.C. on each unit
- Reinforced thermoplastic housing
- Wide offering of head actuators
- IP65

| ADP Serios Plastic 50mm lec Limit Switohes Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Actuator Type | Max. Actuation Speed | Min. Actuation Force | Min. Positive Opening Force | Travel to Operate Contacts | Total Travel | Travel Diagram | Connection Type | Drawing Link * |
| ADP2T13Z11 | \$17.00 | Metal plunger with metal roller | 0.3 ms | 12N | 30 N | $\begin{aligned} & 4.7 \mathrm{~mm} \\ & {[0.18 \mathrm{in}]} \end{aligned}$ | $\begin{aligned} & 9.6 \mathrm{~mm} \\ & {[0.37 \mathrm{in}]} \end{aligned}$ | 1 | (2) PG11 cable entries with (1) $1 / 2$ in NPT adapter | PDF |
| ADP2T14Z11 | \$18.00 | Metal plunger with metal roller and dust cap | 0.5 ms | 15N | 30 N | $\begin{aligned} & 2.5 \mathrm{~mm} \\ & {[0.09 \mathrm{in}]} \end{aligned}$ | $\begin{aligned} & 5.6 \mathrm{~mm} \\ & {[0.22 \mathrm{in}]} \end{aligned}$ | 2 |  | PDF |
| ADP2T35Z11 | \$20.00 | One-way horizontal lever with metal roller and dust cap | 1 ms | 7 N | 24N | $\begin{gathered} 9 \mathrm{~mm} \\ {[0.35 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 21 \mathrm{~mm} \\ {[0.82 \mathrm{in}]} \end{gathered}$ | 3 |  | PDF |
| ADP2T41Z11 | \$18.00 | Side rotary lever with 18 mm nylon roller | 1.5 ms | $0.1 \mathrm{~N} \cdot \mathrm{~m}$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}$ | $31^{\circ}$ | $74^{\circ}$ | 4 |  | PDF |
| ADP2T45Z11 | \$19.00 | Side rotary lever inward with 18 mm nylon roller |  |  |  |  |  |  |  | PDF |
| ADP2T51Z11 | \$19.00 | Side rotary adjustable lever with 18 mm nylon roller |  |  |  |  |  |  |  | PDF |
| ADP2T5100Z11 | \$19.00 | Side rotary 2 mm step adjustable lever with 18 mm nylon roller |  |  |  |  |  |  |  | PDF |
| ADP2T71Z11 | \$20.00 | Side rotary adjustable 3mm stainless steel rod |  |  |  |  |  |  |  | PDF |

* Weights are included on the drawing.



## Achie ${ }^{\prime \prime}{ }^{m}$ <br> IEC Limit Switches

## Travel Diagrams



| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 4.7 |
| C | 7.6 |
| D | 9.6 |
| E | 2.5 |

Diagram 2


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 2.5 |
| C | 4.1 |
| D | 5.6 |
| E | 1.3 |

Diagram 3


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 9 |
| C | 14.5 |
| D | 21 |
| E | 4.9 |

Diagram 4



| TAG | degree |
| :---: | :---: |
| A | 0 |
| B | 31 |
| C | 47 |
| D | 74 |
| E | 17 |

## Achie $\mathbf{V e}^{\prime \prime \prime}$ IEC Limit Switches

## ADM Series Metal 50mm IEC Limit Switches

- 90-degree adjustable head, levers are adjustable $10^{\circ}$ on the operating shaft
- Snap-action contacts 1 N.O. and 1 N.C. on each unit
- Metal enclosure
- Wide offering of head actuators
- IP66; part number ADM2T93Z11 is IP65

|  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Actuator Type | Max. Actuation Speed | Min. Actuation Force | Min. <br> Positive <br> Opening Force | Travel to Operate Contacts | Total <br> Travel | Travel Diagram | Connection Type | Drawing Link * |
| ADM2F11Z11 | \$17.00 | Metal plunger | 0.5 ms | 15N | 30 N | $\begin{aligned} & 2.5 \mathrm{~mm} \\ & {[0.09 \mathrm{in}]} \end{aligned}$ | $\begin{aligned} & 5.6 \mathrm{~mm} \\ & {[0.22 \mathrm{in}]} \end{aligned}$ | 2 |  | PDF |
| ADM2F12Z11 | \$19.00 | Metal plunger with metal roller | 0.3 ms | 12N | 30 N | 4.7 mm [0.18 in] | $\begin{aligned} & 9.6 \mathrm{~mm} \\ & {[0.37 \mathrm{in}]} \end{aligned}$ | 1 |  | PDF |
| ADM2T35Z11 | \$21.00 | One-way horizontal lever with metal roller and dust cap | 1 ms | 7N | 24N | $\begin{gathered} 9 \mathrm{~mm} \\ {[0.35 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 21 \mathrm{~mm} \\ {[0.82 \mathrm{in}]} \end{gathered}$ | 3 |  | PDF |
| ADM2F43Z11 | \$22.00 | Side rotary lever with 18 mm metal roller |  |  |  |  |  |  |  | PDF |
| ADM2F46Z11 | \$23.00 | Side rotary lever inward with 18 mm metal roller |  |  |  |  |  | 4 | (3) 1/2in NPT entries | PDF |
| ADM2F53Z11 | \$23.00 | Side rotary adjustable metal lever with 18 mm metal roller |  |  | $0.32 \mathrm{~N} \cdot \mathrm{~m}$ |  | 74 | 4 |  | PDF |
| ADM2F71Z11 | \$23.00 | Side rotary adjustable 3 mm stainless steel rod |  |  |  |  |  |  |  | PDF |
| ADM2T93Z11 | \$20.00 | 360 degree stainless steel spring | 1 ms | $0.12 \mathrm{~N} \cdot \mathrm{~m}$ |  | $23^{\circ}$ | $23^{\circ}$ | 5 |  | PDF |
| ADM2T9805Z11A | \$28.00 | Pull action with ring | 0.5 ms | 30 N | N/A | 2.0 mm $[0.07 \mathrm{in}]$ | $\begin{aligned} & 5.6 \mathrm{~mm} \\ & {[0.22 \mathrm{in}]} \end{aligned}$ | 6 |  | PDF |
| * Weights are included <br> ADM2F11Z11 | on the dr | awing. <br> ADM2F12Z11 |  | 2T35Z |  |  |  |  |  |  |
| ADM2F53Z11 |  | ADM2F71Z11 |  |  | 12T93Z |  |  |  | 2T9805Z |  |

## Achie $\bigvee e{ }^{*}$ IEC Limit Switches

## Travel Diagrams

Diagram 1


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 4.7 |
| C | 7.6 |
| D | 9.6 |
| E | 2.5 |

Diagram 2


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 2.5 |
| C | 4.1 |
| D | 5.6 |
| E | 1.3 |

Diagram 3


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 9 |
| C | 14.5 |
| D | 21 |
| E | 4.9 |

Diagram 4


| TAG | degree |
| :---: | :---: |
| A | 0 |
| B | 31 |
| C | 47 |
| D | 74 |
| E | 17 |

Diagram 5


| TAG | degree |
| :---: | :---: |
| A | 0 |
| B | 23 |
| C | - |
| D | - |
| E | 12 |

Diagram 6


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 2 |
| C | - |
| D | 5.6 |
| E | 0.9 |

Achie \e" IEC Limit Switches Specifications

| EC Limit Switchos Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| Series |  | $A A M, ~ A A P, ~ A B M, ~ A B P$ | ADM, ADP |
| Environmental |  |  |  |
| Degree of Protection |  | Plastic models: IP65 according to IEC 529 <br> Metal models: IP66 according to IEC 144-CEI70-1; part number ADM2T93Z11 is IP65 |  |
| Temperature Range ${ }^{1}$ | Plastic Models | Storage: -30 to $80^{\circ} \mathrm{C}$ [-22 to $176^{\circ} \mathrm{F}$ ] Operating: -25 to $70^{\circ} \mathrm{C}\left[-13\right.$ to $\left.158^{\circ} \mathrm{F}\right]$; |  |
|  | Metal Models | Storage: -30 to $80^{\circ} \mathrm{C}\left[-22\right.$ to $\left.176^{\circ} \mathrm{F}\right]$ <br> Operating: -10 to $70^{\circ} \mathrm{C}$ [14 to $158^{\circ} \mathrm{F}$ ]; part number ADM2T9805Z11A -40 to $70^{\circ} \mathrm{C}$ [-40 to $158^{\circ} \mathrm{F}$ ] |  |
| Rated Impulse Withstand Voltage |  | 6 kV (degree of pollution 3 ) | 6 kV (degree of pollution 3) |
| Mechanical Ratings |  |  |  |
| Working Positions ${ }^{2}$ |  | All actuators can be rotated in $90^{\circ}$ increments |  |
| Mechanical Life |  | Straight line working heads: 30 million operations, side rotary heads: 25 million operations, multi directional heads: 10 million operations | 25 million operations |
| Enclosure Material |  | Plastic models AAP and ABP: fiberglass-reinforced plastic- <br> V0 class (UL94); <br> Metal models AAM and ABM: die cast aluminum | ADP models: Reinforced thermoplastic ADM models: Zinc Alloy |
| Contact Blocks Rating |  |  |  |
| Positive Opening ${ }^{3}$ |  | All models except 98, 92, 93 operating heads |  |
| Electrical Ratings | AC15 | $\begin{aligned} & \text { Make: 60A@120VAC; 30A @ 240VAC; 18A @ 400VAC } \\ & \text { Break:10A @ 24VAC; 6.5 A @130VAC; 3.1 A@ 230VAC; } \\ & 1.8 \mathrm{~A} @ 400 \mathrm{VAC} \end{aligned}$ | 10A @ 24VAC, 6A @ 120VAC, 4A @ 400VAC |
|  | DC13 | 2.8 A @ 24VDC; 0.5 A @ 110VDC | 6A @ 24VDC, 0.55 A @125VDC, 0.4A @ 250VDC |
| Maximum Switching Frequency |  | Contact blocks: all two cycles per second | 3600 (Cycles/hour) |
| 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 | 10A @ < 500VAC (fuse type gG (gl)) |
| Contact Resistance |  | $25 \mathrm{~m} \Omega$ |  |
| Recommended Min. Operating Speed |  | With snap-action contacts: 20 mm per minute 4 With slow-action contacts: 500 mm per minute ${ }^{5}$ | 20 mm per minute |
| Rated Insulation Voltage |  | 690 V | 500 V |
| Terminals Marking |  | According to CENELEC EN 50013 | According to IEC 60947-5-1 |
| Wiring Connections |  | $2 \times 2.5 \mathrm{~mm}^{2}$ (AWG14) to $2 \times 0.5 \mathrm{~mm}^{2}$ (AWG18) | 18-14 AWG [ 0.75 to $2.5 \mathrm{~mm}^{2}$ ] |
| Wiring Terminal Type |  | Captive screw with self-lifting pressure plate | M3.5 screw with cable clamp (+, -) pozidriv 2 |
| Electrical Protection |  | Double insulation (plastic models only) | ADM models Class 1, ADP models Class II- double insulation |
| 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. |  |
| Tools Needed |  | Phillips screwdriver, \#1 \#2 / Hex wrench, 10mm | Pozidriv 2 screwdriver |
| Approvals |  | UL E191072, CE |  |

${ }^{1}$ 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 1 ms to 3 ms 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.

## IEC Limit Switches Bar Charts

## 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.


## Contacts Configuration



| Part Series | Displacement Values (mm [in] or degrees) |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
|  | $\boldsymbol{A}$ | $\boldsymbol{B}$ | $\boldsymbol{C}$ | $\boldsymbol{P}$ |
| $\boldsymbol{A B M x E 1 1 Z 1 1 ~}$ | $6.0[0.24]$ | $3.0[0.12]$ | $1.8[0.07]$ | $4.6[0.18]$ |
| 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 | $78^{\circ}$ | $33^{\circ}$ | $20^{\circ}$ | $49^{\circ}$ |
| $\boldsymbol{A B M x E 5 2 Z 1 1 ~}$ | $78^{\circ}$ | $33^{\circ}$ | $20^{\circ}$ | $49^{\circ}$ |
| $\boldsymbol{A B M x E 7 1 Z 1 1}$ | $78^{\circ}$ | $33^{\circ}$ | $20^{\circ}$ | $49^{\circ}$ |
| $\boldsymbol{A B M x E 9 2 Z 1 1}$ | - | $21^{\circ}$ | $9^{\circ}$ | - |
| $\boldsymbol{A B M x E 9 3 Z 1 1}$ | - | $21^{\circ}$ | $21^{\circ}$ | - |
| $\boldsymbol{A B P x H 1 4 Z 1 1}$ | $5.9[0.23]$ | $2.2[0.09]$ | $1.0[0.04]$ | $3.8[0.15]$ |
| $\boldsymbol{A B P x H 1 9 Z 1 1}$ | $10.5[0.41]$ | $4.6[0.18]$ | $2.4[0.09]$ | $7.5[0.30]$ |
| $\boldsymbol{A B P x H 3 5 Z 1 1}$ | $17[0.67]$ | $6.8[0.27]$ | $3.8[0.15]$ | $11.3[0.44]$ |
| $\boldsymbol{A B P x H 4 1 Z 1 1}$ | $90^{\circ}$ | $31^{\circ}$ | $19^{\circ}$ | $47^{\circ}$ |
| $\boldsymbol{A B P x H 5 1 Z 1 1}$ | $90^{\circ}$ | $31^{\circ}$ | $19^{\circ}$ | $47^{\circ}$ |
| $\boldsymbol{A B P x H 7 1 Z 1 1}$ | $90^{\circ}$ | $31^{\circ}$ | $19^{\circ}$ | $47^{\circ}$ |
| $\boldsymbol{A B P x H 9 2 Z 1 1}$ | - | $27^{\circ}$ | $15^{\circ}$ | - |
| $\boldsymbol{A B P x H 9 3 Z 1 1}$ | - | $27^{\circ}$ | $15^{\circ}$ | - |

## 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)

| 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.

$$
\begin{aligned}
\square & =\text { Contact open } \\
& =\text { Contact closed }
\end{aligned}
$$

## Bar Chart Examples

 (cam angle is 30 degrees)

## Achie e ew $^{\text {w }}$ IEC Limit Switches

## AHP Series Plastic 37mm IEC Limit Switch With Remote Reset - 24VDC

- 90-degree adjustable head, levers are adjustable to any angle on the operating shaft
- 2 N.C. snap-action contacts per unit
- IP65
- Wide variety of head actuators

IEC Limit Switch With Remote Reset - 24VDC Selection Chart

| Part Number | Price | Actuator Type | $\begin{gathered} \text { Max. } \\ \text { Actuation } \\ \text { Speed } \end{gathered}$ | $\begin{aligned} & \text { Min. } \\ & \text { Actuation } \\ & \text { Force } \end{aligned}$ | Min. Positive Opening Force | Travel to Operate Contacts | Total <br> Travel | Travel Diagram | Connection Type | Drawing Link * |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Plastic Enclosure with 1m Cable |  |  |  |  |  |  |  |  |  |  |
| AHP2R002J02-024 | \$46.00 | Plastic plunger | 1 ms | 15N | 30 N | $\begin{aligned} & 2.4 \mathrm{~mm} \\ & {[0.09 \mathrm{in}]} \end{aligned}$ | $\begin{gathered} 4.5 \mathrm{~mm} \\ {[0.17 \mathrm{in}]} \end{gathered}$ | 1 | (2) PG11 and (1) $1 / 2$ in NPT cable entries | PDF |
| AHP2T11J02-024 | \$42.00 | Metal plunger | 0.5 ms | 15N | 30N | $\begin{aligned} & 2.4 \mathrm{~mm} \\ & {[0.09 \mathrm{in}]} \end{aligned}$ | $\begin{gathered} 4.5 \mathrm{~mm} \\ {[0.17 \mathrm{in}]} \end{gathered}$ |  |  | PDF |
| AHP2T12J02-024 | \$43.00 | Metal plunger with metal roller | 0.3 ms | 12N | 30 N | $\begin{aligned} & 4.5 \mathrm{~mm} \\ & {[0.17 \mathrm{in}]} \end{aligned}$ | $\begin{aligned} & 7.8 \mathrm{~mm} \\ & {[0.30 \mathrm{in}]} \end{aligned}$ | 2 |  | PDF |
| AHP2T30J02-024 | \$43.00 | One-way horizontal lever with 12.5 mm plastic roller | 1 ms | 7N | 24N | $\begin{gathered} 8.6 \mathrm{~mm} \\ {[0.33 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 17.5 \mathrm{~mm} \\ {[0.68 \mathrm{in}]} \end{gathered}$ | 3 |  | PDF |
| AHP2T32J02-024 | \$43.00 | One-way vertical lever with 12.5 mm plastic roller |  |  |  |  |  |  |  | PDF |
| AHP2T41J02-024 | \$44.00 | Side rotary lever with 18 mm nylon roller | 1.5 ms | 0.1 N*m | $0.32 \mathrm{~N} \cdot \mathrm{~m}$ | $30^{\circ}$ | $62^{\circ}$ | 4 |  | PDF |
| AHP2T5100J02-024 | \$45.00 | Side rotary 2 mm step adjustable lever with 18 mm nylon roller |  |  |  |  |  |  |  | PDF |
| AHP2T5200J02-024 | \$46.00 | Side rotary 2 mm step adjustable lever with 50 mm nylon roller |  |  |  |  |  |  |  | PDF |

* Weights are included on the drawing.


## Travel Diagrams

Diagram 1


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 2.4 |
| C | 4 |
| D | 4.5 |

Diagram 2


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 4.5 |
| C | 7.4 |
| D | 7.8 |

Diagram 3


| TAG | mm |
| :---: | :---: |
| A | 0 |
| B | 8.6 |
| C | 13.1 |
| D | 17.5 |

Diagram 4


| TAG | degree |
| :---: | :---: |
| A | 0 |
| B | 30 |
| C | 46 |
| D | 62 |

## Achie $\backslash{ }^{\text {w }}$ IEC Limit Switches With Remote Reset 24VDC

## Wiring Diagrams



## Achie $\backslash \mathbf{e}^{\text {m }}$ IEC Limit Switches With Remote Reset 24VDC

## Wiring Diagrams


AHP2T30J02-024

- 1. Limit switch not actuated
- 2. Activation
- 3. Limit switch actuated
- 4. Reset by solenoid

AHP2T32J02-024



1



2


3


1


## AchieVe"

## IEC Limit Switches With Remote

 Reset 24V
## Wiring Diagrams



AHP2T5100J02-024


1


2


3


- 1. Limit switch not actuated
- 2. Activation
- 3. Limit switch actuated
- 4. Reset by solenoid

- 1. Limit switch not actuated
- 2. Activation
- 3. Limit switch actuated
- 4. Reset by solenoid


# IEC Limit Switches With Remote Reset 24V Specifications 

| IEC Limit Switch Whth Remote Reset $24 V$ Sperifications |  |  |
| :---: | :---: | :---: |
| Environmental |  |  |
| Degree of Protection |  | IP65 |
| Temperature Range |  | Storage: -30 to $80^{\circ} \mathrm{C}\left[-22\right.$ to $\left.176^{\circ} \mathrm{F}\right]$ Operating: -25 to $70^{\circ} \mathrm{C}$ [-13 to $158^{\circ} \mathrm{F}$ ] |
| Rated Impulse Withstand Voltage |  | 6 kV (degree of pollution 3) |
| Mechanical Ratings |  |  |
| Working Positions |  | 90-degree adjustable head |
| Mechanical Life |  | 50,000 Operations |
| Enclosure Material |  | Reinforced thermoplastic |
| Contact Blocks Rating |  |  |
| Positive Opening |  | Yes |
| Electrical Ratings (according to IEC 60947-1) | AC-15 | 4A@ 400VAC |
|  | DC-13 | 3A@ 24VDC |
| Switching Frequency |  | Max. 119 operations/hour |
| Repeat Accuracy |  | 119ops/h |
| Short-Circuit Protection |  | 4A @ 500VAC, 3A @ 24VDC. gG (gl) type fuses |
| Contact Resistance |  | $25 \mathrm{~m} \Omega$ |
| Rated Insulation Voltage | according to IEC 60947-1 and EN 60947-1 | 400 V |
|  | according to UL508 and CSA C22-2n ${ }^{\circ} 14$ | A300-Q300 |
| Terminal Markings |  | According to IEC 60947-5-1 |
| Wiring Connections |  | 18-14 AWG [0.75 to $2.5 \mathrm{~mm}^{2}$ ] |
| Connection Type |  | (2) PG11 and (1) 1/2in NPT cable entries |
| Torque Requirements | Head | 0.5 to $0.8 \mathrm{~N} \cdot \mathrm{~m}$ [4.42 to 7.08 in-lb] |
|  | Switch and Solenoid | 0.8 to $0.9 \mathrm{~N} \cdot \mathrm{~m}$ [7.08 to 7.96 in-lb] |
| Solenoid Supply Voltage |  | 24 VAC/VDC +/- 10\% |
| Solenoid Current Consumption |  | 4.25 A |
| Solenoid ON time |  | 0.2 to 0.5 sec |
| Solenoid OFF Time* |  | Min. 30 sec |
| Safety Data |  |  |
| Electrical Protection (according to IEC 61140) |  | Class II |
| Agency Approvals** |  | UL, CE |

[^1]
## Achie ${ }^{\text {Wew }}$ Compact Limit Switches

## AEM Series (Metal Plunger Actuator)

- Die-cast metal housings
- $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25 mm [0.98 in] hole spacing
- Wide offering of head actuators
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22), slow-make/slow-break (X11), contacts available
- N.C. contacts are positive-opening operated unless otherwise noted.

| AEM Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | $\begin{gathered} \text { Drawing } \\ \text { Link } \end{gathered}$ | Actuator Type | Max. Actuation Speed | Min. Actuation Force | Min. Positive Opening Force | Number of Contacts | Contact Configuration | Connection Type | Photo |
| AEM2G11Z11-3 | \$27.50 | PDF | Metal plunger | 0.5 ms | 15N | 30 N | 1 N.O. 11 N.C. | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | A |
| AEM2G11X11-3 | \$27.50 | PDF |  |  |  |  |  | Diagram 2 |  |  |
| AEM2G1101Z11-3R | \$25.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G1101Z11M | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quickdisconnect (bottom exit) |  |
| AEM2G1101Z11MR | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quickdisconnect (right exit) |  |
| AEM2G1101722-3 | \$33.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | Diagram 3 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | B |
| AEM2G16Z11-3 | \$32.00 | PDF | Metal plunger with dust cap | 0.5 ms | 15N | 30 N | 1 N.O./1 N.C. | Diagram 1 | 9.8 ft [3m] cable (bottom exit) | C |
| AEM2G16X11-3 | \$32.00 | PDF |  |  |  |  |  | Diagram 2 |  |  |
| AEM2G1601Z11-3R | \$27.50 | PDF |  |  |  |  |  | Diagram 1 | 9.8 ft [3m] cable (right exit) |  |
| AEM2G1601Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quickdisconnect (bottom exit) |  |
| AEM2G1601Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-Pin M12 quickdisconnect (right exit) |  |
| AEM2G1601Z22-3 | \$35.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | Diagram 3 | 9.8 ft [3m] cable (bottom exit) | D |
| AEM2G18Z11-3 | \$38.00 | PDF | Metal plunger with bevel cut | 0.5 ms | 15N | 30 N | 1 N.O. 11 N.C. | Diagram 1 | 9.8 ft [3m] cable (bottom exit) | E |
| AEM2G1801211-3R | Retired | PDF |  |  |  |  |  |  | 9.8 ft [3m] cable (right exit) |  |
| AEM2G1801211MR | \$33.50 | PDF |  |  |  |  |  |  | 5-pin M12 quickdisconnect (right exit) |  |
| AEM2G21Z11-3 | \$30.00 | PDF | Metal plunger with fixing nuts | 0.5 ms | 15N | 30 N |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | F |
| AEM2G21X11-3 | \$30.00 | PDF |  |  |  |  |  | Diagram 2 |  |  |
| AEM2G2101Z11-3R | \$26.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G2101Z11M | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quickdisconnect (bottom exit) |  |
| AEM2G2101Z11MR | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quickdisconnect (right exit) |  |
| AEM2G2101Z22-3 | \$33.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | Diagram 3 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | G |

## Achie $\backslash$ e" Compact Limit Switches

AEM Series (Metal Plunger Actuator)


## Achie $\$ e" Compact Limit Switches

## AEM Series (Metal Plunger with Roller Actuator)

- Die-cast metal housings
- $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable $/ 5$-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25 mm [ 0.98 in ] hole spacing
- Wide offering of head actuators
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22), slow-make/slow-break (X11), contacts available
- N.C. contacts are positive-opening operated unless otherwise noted $\Theta$

| AEM Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Force | $\begin{aligned} & \text { Min. } \\ & \text { Actuation } \\ & \text { Force } \end{aligned}$ | Min. Positive Opening Force | Number of Contacts | Contact Configuration | Connection Type | Photo |
| AEM2G12Z11-3 | \$33.50 | PDF | Metal plunger with metal roller | 0.1 ms | 10N | 30 N | 1 N.O./1 N.C. | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable | A |
| AEM2G12X11-3 | \$33.50 | PDF |  |  |  |  |  | Diagram 2 | (bottom exit) |  |
| AEM2G1201Z11-3R | \$27.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G1201Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (bottom exit) |  |
| AEM2G1201Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |  |
| AEM2G1201722-3 | \$35.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | Diagram 3 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | B |
| AEM2G13Z11-3 | \$32.00 | PDF | Metal plunger with nylon roller | 0.1 ms | 10N | 30 N | 1 N.O./1 N.C. | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | C |
| AEM2G13X11-3 | \$32.00 | PDF |  |  |  |  |  | Diagram 2 |  |  |
| AEM2G1301Z11-3R | \$27.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G1301Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (bottom exit) |  |
| AEM2G1301Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |  |
| AEM2G14Z11-3 | \$33.00 | PDF | Metal plunger with metal cross roller | 0.1 ms | 10N | 30 N |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | D |
| AEM2G14X11-3 | \$33.00 | PDF |  |  |  |  |  | Diagram 2 |  |  |
| AEM2G1401Z11-3R | \$27.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G1401Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (bottom exit) |  |
| AEM2G1401Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |  |
| AEM2G15Z11-3 | \$31.00 | PDF | Metal plunger with nylon cross roller | 0.1 ms | 10N | 30 N |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | E |
| AEM2G15X11-3 | \$31.00 | PDF |  |  |  |  |  | Diagram 2 |  |  |
| AEM2G1501Z11-3R | \$26.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G1501Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (bottom exit) |  |
| AEM2G1501Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |  |

## Achie ${ }^{\text {VI }}$ Compact Limit Switches

AEM Series (Metal Plunger with Roller Actuator)

## (Continued)



## Achie $\$ e" Compact Limit Switches

## AEM Series (Metal Plunger with Roller Actuator)

(Continued)


## Achie ${ }^{\text {Wew }}$ Compact Limit Switches

## AEM Series (Lever with Roller Actuator)

- Die-cast metal housings
- $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable $/ 5$-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25 mm [0.98 in] hole spacing
- Wide offering of head actuators
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22), slow-make/slow-break (X11), contacts available
- N.C. contacts are positive-opening operated unless otherwise noted

| AEM Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed | Min. Actuation Force | Min. Positive Opening Force | Number of Contacts | Contact Configuration | Connection Type | Photo |
| AEM2G41Z11-3 | \$30.00 | PDF | Side rotary lever with 14 mm nylon roller | 1.5 ms | 0.08 N•m | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ | 1 N.O./1 N.C. | Diagram 1 | $9.8 \mathrm{ft} \mathrm{[3m]} \mathrm{cable}$ | A |
| AEM2G41X11-3 | \$30.00 | PDF |  |  |  |  |  | Diagram 2 | (bottom exit) |  |
| AEM2G4120Z11-3R | \$26.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G4120Z11M | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (bottom exit) |  |
| AEM2G4120Z11MR | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (right exit) |  |
| AEM2G4120Z22-3 | \$33.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | Diagram 3 | 9.8 ft [3m] cable (bottom exit) |  |
| AEM2G42Z11-3 | \$30.50 | PDF | Side rotary lever with 14 mm metal roller | 1.5 ms | $0.08 \mathrm{~N} \cdot \mathrm{~m}$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ | Diagram 1 <br> Diagram 2 <br>  <br> Diagram 1 |  | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable | B |
| AEM2G42X11-3 | \$30.50 | PDF |  |  |  |  |  |  | (bottom exit) |  |
| AEM2G4220Z11-3R | \$26.50 | PDF |  |  |  |  |  |  | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G4220Z11M | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (bottom exit) |  |
| AEM2G4220Z11MR | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quickdisconnect (right exit) |  |
| AEM2G43Z11-3 | \$31.00 | PDF | Side rotary lever with 14 mm ball bearing roller | 1.5 ms | $0.08 \mathrm{~N} \cdot \mathrm{~m}$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ | 1 N.O. 11 N.C. | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable | C |
| AEM2G43X11-3 | \$31.00 | PDF |  |  |  |  |  | Diagram 2 | (bottom exit) |  |
| AEM2G4320Z11-3R | \$27.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G4320Z11M | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (bottom exit) |  |
| AEM2G4320Z11MR | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (right exit) |  |
| AEM2G45Z11-3 | \$32.00 | PDF | Side rotary lever with 18 mm nylon roller | 1.5 ms | $0.08 \mathrm{~N} \cdot \mathrm{~m}$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | D |
| AEM2G45X11-3 | \$32.00 | PDF |  |  |  |  |  | Diagram 2 |  |  |
| AEM2G4520Z11-3R | \$27.50 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G4520Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (bottom exit) |  |
| AEM2G4520Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (right exit) |  |

## Achie $\$ e"' Compact Limit Switches

## AEM Series (Adjustable Lever with Roller Actuator)

- Die-cast metal housings
- $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25 mm [0.98 in] hole spacing
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22), slow-make/slow-break (X11), contacts available
- N.C. contacts are positive-opening operated unless otherwise noted.

| AEM Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | $\begin{gathered} \text { Drawing } \\ \text { Link } \end{gathered}$ | Actuator Type | Max. Actuation Speed | $\begin{aligned} & \text { Min. } \\ & \text { Actuation } \\ & \text { Force } \end{aligned}$ | Min. Positive Opening Force | Number of Contacts | Contact Configuration | Connection Type | Photo |
| AEM2G51Z11-3 | \$33.00 | PDF | Side rotary adjustable lever with 18 mm nylon roller | 1.5 ms | $0.08 \mathrm{~N} \cdot \mathrm{~m}$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ | 1 N.O./1 N.C. | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable | A |
| AEM2G51X11-3 | \$33.00 | PDF |  |  |  |  |  | Diagram 2 | (bottom exit) |  |
| AEM2G5120Z11-3R | \$29.00 | PDF |  |  |  |  |  | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G5120Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (bottom exit) |  |
| AEM2G5120Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |  |
| AEM2G5120Z22-3 | \$36.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | Diagram 3 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) |  |




Cable Out (right exit)


5-pin M12 quick-disconnect (bottom exit)


5-pin M12 quick-disconnect (right exit)

## Compact Limit Switches

## AEM2G Series (Adjustable Lever with SS Nylon Tip)

- Die-cast metal housings
- 3m cable/5-pin M12 quick-disconnect (center and right)
- 1 N.O. and 1 N.C. contact on all units
- Compact size with standard 25 mm hole spacing
- Epoxy resin-filled for IP67 rating
- Both snap-action (Z11) and slow-make/slow-break (X11) contacts available

| AEM2G Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. <br> Actuation Speed ( $\mathrm{m} / \mathrm{s}$ ) | Min. Actuation Force ( $N$ ) <br> Torque ( $N \cdot m$ ) | Min. Positive Opening Force ( $N$ ) Torque ( $N \cdot m$ ) | Contact Configuration | Connection Type | Photo |
| AEM2G61Z11-3 | \$32.00 | PDF | Side rotary lever with nylon tipped stainless steel spring | 1.5 | 0.08 | 0.28 | Diagram 1 | Cable Out (bottom) | A |
| AEM2G61X11-3 | \$32.00 | PDF |  |  |  |  | Diagram 2 |  |  |
| AEM2G6120Z11-3R | \$27.50 | PDF |  |  |  |  | Diagram 1 | Cable Out (right) |  |
| AEM2G6120Z11M | \$25.50 | PDF |  |  |  |  |  | 5-pin M12 quickdisconnect (bottom) |  |
| AEM2G6120Z11MR | \$25.50 | PDF |  |  |  |  |  | 5-pin M12 quickdisconnect (right) |  |




Cable Out (bottom)
A



5-pin M12 quick-disconnect (bottom)


Cable Out (right)


5-pin M12 quick-disconnect (right)

## Compact Limit Switches

## AEM2G Series (Adjustable Rod Actuator)

- Die-cast metal housings
- 3m cable/5-pin M12 quick-disconnect (center and right)
- 1 N.O. and 1 N.C. contact on all units
- Compact size with standard 25 mm hole spacing
- Wide offering of head actuators
- Epoxy resin-filled for IP67 rating
- Both snap-action (Z11) and slow-make/slow-break (X11) contacts available
- N.C. contacts are positive-opening operated unless otherwise noted $\Theta$

AEM2G Series Compact Limit Switches Selection Chart

| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed (m/s) | Min. Actuation Force ( $N$ ) <br> Torque ( $N \cdot m$ ) | Min. Positive Opening Force ( $N$ ) Torque ( $N \cdot m$ ) | Contact Config. Diagram | Connection Type | Photo |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AEM2G71Z11-3 | \$32.00 | PDF | Side rotary adjustable 3 mm stainless steel rod | 1.5 | 0.08 | 0.28 | Diagram 1 | Cable Out (bottom) | A |
| AEM2G71X11-3 | \$32.00 | PDF |  |  |  |  | Diagram 2 |  |  |
| AEM2G7120Z11-3R | \$27.50 | PDF |  |  |  |  | Diagram 1 | Cable Out (right) |  |
| AEM2G7120Z11M | \$25.50 | PDF |  |  |  |  |  | 5-pin M12 quickdisconnect (bottom) |  |
| AEM2G7120Z11MR | \$25.50 | PDF |  |  |  |  |  | 5-pin M12 quickdisconnect (right) |  |
| AEM2G73Z11-3 | \$31.50 | PDF | Side rotary adjustable 6 mm nylon rod | 1.5 | 0.08 | 0.28 | Diagram 1 | Cable Out (bottom) | B |
| AEM2G73X11-3 | \$31.50 | PDF |  |  |  |  | Diagram 2 |  |  |
| AEM2G7320Z11-3R | \$27.50 | PDF |  |  |  |  | Diagram 1 | Cable Out (right) |  |
| AEM2G7320Z11M | \$25.50 | PDF |  |  |  |  |  | 5-pin M12 quickdisconnect (bottom) |  |
| AEM2G7320Z11MR | \$25.50 | PDF |  |  |  |  |  | 5-pin M12 quickdisconnect (right) |  |
| AEM2G74Z11-3 | \$31.50 | PDF | Side rotary adjustable 6 mm fiberglass rod | 1.5 | 0.08 | 0.28 | Diagram 1 | Cable Out (bottom) | C |
| AEM2G75Z11-3 | \$31.50 | PDF | Side rotary adjustable 3 mm square steel shaft | 1.5 | 0.08 | 0.28 | Diagram 1 | Cable Out (bottom) | D |



Cable Out (bottom)


5-pin M12 quick-disconnect (bottom)


Cable Out (right)


5-pin M12 quick-disconnect (right)

## Achie ${ }^{(10}$ " Compact Limit Switches

## AEM Series (360 Degree Spring Actuator)

- Die-cast metal housings
- $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25 mm [0.98 in] hole spacing
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22), slow-make/slow-break (X11), contacts available

| AEM Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max Actuation Speed | $\begin{gathered} \text { Min. } \\ \text { Actuation } \\ \text { Force } \end{gathered}$ | Min. Positive Opening Force | Number of Contacts | Contact Configuration | Connection Type | Photo |
| AEM2G92Z11-3 | \$31.00 | PDF | 360 degree stainless steel spring with nylon tip | 0.1 ms | 10N | 30 N | 1 N.O./1 N.C. | Diagram 1 | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (bottom exit) | A |
| AEM2G9201Z11-3R | \$27.50 | PDF |  |  |  |  |  |  | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G9201Z11M | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (bottom exit) |  |
| AEM2G9201Z11MR | \$24.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |  |
| AEM2G93Z11-3 | \$31.00 | PDF | 360 degree stainless steel spring | 1.0 ms | $0.10 \mathrm{~N} \cdot \mathrm{~m}$ | - |  | Diagram 1 | 9.8 ft [3m] cable (bottom exit) | B |
| AEM2G9301Z11-3R | \$27.50 | PDF |  |  |  |  |  |  | $9.8 \mathrm{ft}[3 \mathrm{~m}]$ cable (right exit) |  |
| AEM2G9301Z11M | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick- disconnect (bottom exit) |  |
| AEM2G9301Z11MR | \$25.50 | PDF |  |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |  |
| AEM2G9301Z22-3 | \$34.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | Diagram 3 | 9.8 ft [3m] cable (bottom exit) |  |



Cable Out (bottom exit)


5-pin M12 quick-disconnect (bottom exit)


Cable Out (right exit)


5-pin M12 quick-disconnect (right exit)

Achie $\ \mathbf{e}^{w}$ Compact Limit Switches

## Specifications

| A EM Serics Compact Limit Switches Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| Type |  | 1 N.O. / 1 N.C. | 2 N.O. / 2 N.C. |
| Environmental |  |  |  |
| Degree of Protection |  | IP67 according to IEC 60529 |  |
| Temperature Range |  | Storage: -40 to $70^{\circ} \mathrm{C}\left(-40\right.$ to $\left.158^{\circ} \mathrm{F}\right)$. Operating: -25 to $70^{\circ} \mathrm{C}\left[-13\right.$ to $158^{\circ} \mathrm{F}$ ] |  |
| Mechanical Ratings |  |  |  |
| Mechanical Life |  | 10 million operations. Models G16, G92, G93: 5 million operations. |  |
| Enclosure Material |  | ZAMAK (zinc alloy) |  |
| Contact Blocks Rating |  |  |  |
| Positive Opening |  | Yes, except G61, G92, G93 | All models except 92,93 operating heads |
| Electrical Ratings | AC-15 | Make: 100A @ 24VAC; 60A @ 120VAC; 30A @ 240VAC Break: 10A @ 24VAC; 6A @ 120VAC; 3A @ 240VAC | 4A @ 24VDC, 3A @ 240VAC |
|  | DC-13 | 2.8 A @ 24VDC; 0.55 A @ 125VDC; 0.27 A@250VDC | 2A @ 24VDC, 0.4 A @ 250VDC |
| Maximum Switching Frequency |  | Contact blocks: all one cycle per second | 3600 [cycles/hour] |
| Repeat Accuracy |  | 0.05 mm on the operating points at 1 million operations |  |
| Short-Circuit Protection |  | 10A @ < 500V | $4 \mathrm{~A} @<500$ VAC Part number AEM2G9301Z22-3 is $10 \mathrm{~A} @<500$ VAC |
| Contact Resistance |  | $25 \mathrm{~m} \Omega$ |  |
| Recommended Min Operating Speed |  | With snap-action contacts: 20 mm per minute With slow-action contacts: 500 mm per minute |  |
| Rated Insulation Voltage |  | B300, R300 according to UL508; 400 V (degree of pollution: 3 ) according to IEC 60947-1 | C300-R300 according to UL508, 250V (degree of pollution 3) |
| Connection Type |  | Cable: 3 m [ 9.8 ft ] PVC cable, $5 \times 0.75 \mathrm{~mm}^{2}$ (18AWG). <br> Overall cable diameter: 8.20 mm ( 0.32 in ) Connector: 5-pin M12 quick-disconnect | Pigtail $3 \mathrm{~m}\left[9.8 \mathrm{ft}\right.$ ], PVC, $0.5 \mathrm{~mm}^{2}$ [20AWG] |
| Wiring Terminal Markings |  | According to CENELEC EN50013 | N.C. Gray/Brown Red/Pink N.O. Blue/Yellow Green/White |
| Electrical Protection |  | Class I according to IEC60536-1 |  |
| 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. |  |
| Torque |  | All: $0.5 \mathrm{~N} \cdot \mathrm{~m}[0.8 \mathrm{~N} \cdot \mathrm{~m}$ max] | N/A |
| Approvals |  | UL file E191072, CE |  |

*To obtain the most current agency approval information, see the Agency Compliance \& Certifications Checklist section on the specific part number's web page.

## Achie $\$ ew ${ }^{\text {w }}$ Compact Limit Switches Supplemental

## 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.

## Contact Displacement Values and Bar Charts



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
$\mathrm{D}=$ Differential travel (between actuation and release)
$P=$ Point from which positive opening is assured during actuation

Bar Chart Examples (cam angle is 30 degrees)


Diagram in millimeters/cam travel


Diagram in degrees/lever rotation


Diagram in millimeters/plunger travel


Note: Values represent travel of cam in direction of arrow.

| Contact Displacement Values |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Part Series | Contact Configuration | Displacement Values mm [in] or degrees |  |  |  |
|  |  | A | $B$ | C | P |
| AEM2G11, AEM2G16, AEM2G18, AEM2G21 | Z11 | 5.0 [0.20] | 2.2 [0.09] | 1.4 [0.06] | 4.3 [0.17] |
| AEM2G11, AEM2G16, AEM2G21 | X11 | 5.0 [0.20] | 1.9 [0.07] | 3.2 [0.13] | 3.4 [0.13] |
| AEM2G11, AEM2G16, AEM2G21 | Z22 | 5.0 [0.20] | 2.1 [0.82] | 1.3 [0.05] | 4.0 [0.16] |
| AEM2G12, AEM2G13, AEM2G14, AEM2G15, AEM2G17, AEM2G18, AEM2G22, AEM2G23, AEM2G24, AEM2G25 | Z11 | 8.7 [0.34] | 3.8 [0.15] | 2.4 [0.09] | 7.5 [0.30] |
| AEM2G12, AEM2G13, AEM2G14, AEM2G15, AEM2G22, AEM2G23, AEM2G24, AEM2G25 | X11 | 8.7 [0.34] | 3.3 [0.13] | 5.7 [0.22] | 5.9 [0.23] |
| AEM2G12, AEM2G22 | Z22 | 3.6 [0.14] | 8.7 [0.34] | 2.3 [0.09] | 7.0 [0.27] |
| AEM2G41, AEM2G42, AEM2G43, AEM2G45, AEM2G51, AEM2G71, AEM2G72, AEM2G73, AEM2G74, AEM2G75 | Z11 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEM2G41, AEM2G42, AEM2G43, AEM2G45, AEM2G51, AEM2G71, AEM2G72, AEM2G73, AEM2G74, AEM2G75 | X11 | $74^{\circ}$ | $28^{\circ}$ | $48^{\circ}$ | $50^{\circ}$ |
| AEM2G41, AEM2G51 | Z22 | $75^{\circ}$ | $30^{\circ}$ | $10^{\circ}$ | $55^{\circ}$ |
| AEM2G61 | Z11 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ |  |
| AEM2G61 | X11 | $74^{\circ}$ | $28^{\circ}$ | $48^{\circ}$ | Not |
| AEM2G92 | Z11 | - | $20^{\circ}$ | $10^{\circ}$ | positiveopening |
| AEM2G93 | Z11 | - | $20^{\circ}$ | $10^{\circ}$ |  |
| AEM2G93 | Z22 | - | $19^{\circ}$ | $5^{\circ}$ | - |

## Precision Limit Switches

## Precision Touch Limit Switches

- Slim design (from M5) allows side-by-side installation
- Long-stroke and water-resistant models available
- 5 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- Stainless steel housing
- Metal bearing
- Straight-touch and straight needle touch available


O indicates correct target approach and orientation. X indicates approach and orientation that should be avoided.

Precision Touch Limit Switches Selection Chart

| Precision Touch Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator/ Head Type* | Barrel Type | Barrel Diameter/ Thread* | Stroke | Switching Output | Contact Force | Connection Type | Photo |
| Straight Touch |  |  |  |  |  |  |  |  |  |  |
| CSJ055A-L | \$54.00 | PDF | $\varnothing 2 \mathrm{~mm}$ plunger, SR 1.5 mm | Threaded | M $5 \times 0.5$ | 2.8 mm | N.O. | 1N | Cable, 3 m length | A |
| CSJS50A-L | \$54.00 | PDF |  | Smooth | $\varnothing 5 \mathrm{~mm}$ |  |  |  |  | B |
| CS065A-L | \$60.00 | PDF |  | Threaded | M6×0.5 |  |  |  |  | C |
| CSS60A-L | \$56.00 | PDF |  | Smooth | $\bigcirc 6 \mathrm{~mm}$ |  |  |  |  | D |
| CSS60B-L | \$56.00 | PDF |  |  |  |  | N.C. |  |  | E |
| CS067A-L | \$60.00 | PDF |  | Threaded | M6×0.75 |  | N.O. |  |  | F |
| CS067B-L | \$60.00 | PDF |  |  |  |  | N.C. |  |  | G |
| CS067A-BL | \$65.00 | PDF | $\varnothing$ 2mm plunger, $\varnothing 4 \mathrm{~mm}$ flat |  |  |  | N.O. |  |  | H |
| CSS80A-L | \$56.00 | PDF |  | Smooth | $\varnothing 8 \mathrm{~mm}$ |  |  |  |  | I |
| CS087A-L | \$60.00 | PDF | $\emptyset 3.5$ mm plunger, | Threaded | M8×0.75 |  |  |  |  | J |
| CSK087A-L | \$67.00 | PDF | SR 3mm |  |  | 5 mm |  |  |  | K |
| CSK087B-L | \$67.00 | PDF |  |  |  |  | N.C. |  |  |  |
| CSP087A-AL | \$78.00 | PDF | $\varnothing 2 \mathrm{~mm}$ ball |  |  | 2.8 mm | N.O. |  |  |  |
| CSP087B-AL | \$78.00 | PDF |  |  |  |  | N.C. |  |  |  |
| Straight Needle Contact Touch |  |  |  |  |  |  |  |  |  |  |
| CSJ055A-CL | \$60.00 | PDF | 1.5mm flat | Threaded | M $5 \times 0.5$ | 2.8 mm | N.O. | 1N | Cable, 3 m length | M |
| CS065A-CL | \$67.00 | PDF |  |  | M6×0.5 |  |  |  |  | N |
| CS067A-CL | \$83.00 | PDF |  |  | M6×0.75 |  |  |  |  | 0 |

* $\varnothing$ = diameter, SR = surface radius
-L: LED indicator (mounted in cable 120 mm from the switch)



## Precision Limit Switches

| Precision Touch Limit Switches Specifications |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Straight Touch Switches |  |  |  |  |
| Series | CS | CSJ | CSS | CSK | CSP |
| Environmental |  |  |  |  |  |
| Degree of Protection | IP65 |  |  |  |  |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176^{\circ} \mathrm{F}$ ] (Ice-free) |  |  |  |  |
| Mechanical Ratings |  |  |  |  |  |
| Enclosure Material | Stainless Steel |  |  |  |  |
| Pretravel | 0.3 mm |  |  |  |  |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | $4 \mathrm{~N} \cdot \mathrm{~m}$ | $2 \mathrm{~N} \cdot \mathrm{~m}$ | N/A | N/A | $7 \mathrm{~N} \cdot \mathrm{~m}$ |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |  |  |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $X, Y, Z$ each direction |  |  |  |  |
| Repeat Accuracy | 5 micron ( $\mu \mathrm{m}$ ) |  |  |  |  |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm} /$ minute |  |  |  |  |
| Electrical Ratings |  |  |  |  |  |
| Contact Life | 10 million operations |  |  |  |  |
| Contact Voltage | 5-24VDC |  |  |  |  |
| Steady Current Rating | 10 mA or less |  |  |  |  |
| Max In-rush Current Rating | 10 mA ( (limit current to protect LED indicator) |  |  |  |  |
| Connection Type | Cable: 3 m ( 2 m for CSHP series) Oil resistant $\varnothing 2.8 / 2$ cores, Tensile strength 30 N , minimum bending R7 |  |  |  |  |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |  |  |  |

* At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.


## Circuit Diagrams

| Without LED | With LED |
| :---: | :---: |
| Normally open (N.O.) | Normally open (N.O.) |
| O Brown | LED Normally Off |
| Normally closed (N.C.) | Normally closed (N.C.) |
| O Brown | LED Normally On |
| O Blue |  |

## Precision Limit Switches

## Precision Touch Limit Switches

- Ultra-small design (M5 or Ø5)
- 3 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- No movement differential
- Dustproof / water-resistant (IP67) models available
- Stainless steel housings
- Metal bearing


O indicates correct target approach and orientation.
X indicates approach and orientation that should be avoided.

## Precision Touch Limit Switches Selection Chart

| Precision Touch Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator/Head Type* | Barrel | Barrel Diameter/ <br> Thread* | Stroke | Switching Output | Contact Force | Connection Type | Photo |
| Straight Touch |  |  |  |  |  |  |  |  |  |  |
| PT5M3WA | \$72.00 | PDF | $\varnothing 1.5 \mathrm{~mm}$ plunger, SR 2 mm | Threaded | M $5 \times 0.5$ | 1.5 mm | N.O. | 0.5 N | Core wire, 0.5 m length | A |
| PT5M3WB | \$72.00 | PDF |  |  |  |  | N.C. |  |  | B |
| PT5M3CB-L | \$86.00 | PDF |  |  |  |  |  |  | Cable, 2 m length | C |
| PT5S3CB-L | \$81.00 | PDF |  | Smooth | $\emptyset 5 \mathrm{~mm}$ |  |  |  |  | D |
| PTP5M3CB-L | \$94.00 | PDF |  | Threaded | M5 $\times 0.5$ |  |  | 0.8 N |  | E |
| PTP5S3CB-L | \$88.00 | PDF |  | Smooth | $\varnothing 5 \mathrm{~mm}$ |  |  |  |  | F |

* $\emptyset$ = diameter, SR = surface radius
-L: LED indicator (mounted in cable 120 mm from the switch)



## Precision Limit Switches



* Adjust the installed location of the switch by the signal switching point.
** At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.


## Circuit Diagrams

| Without LED | With LED |
| :---: | :---: |
| Normally open (N.O.) | Normally open (N.O.) <br> LED Normally Off |
| Normally closed (N.C.) | Normally closed (N.C.) <br> LED Normally On |

## Precision Limit Switches

## High Precision Touch and Tool Setter Switches

- 0.5 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- No movement differential
- No temperature drift
- Dustproof / water-resistant (IP67)
- LED indicator
- Stainless steel


O indicates correct target approach and orientation.
X indicates approach and orientation that should be avoided.


P10DHA-TML
P10DHB-TML
P10DHLTB-TML

| High Precision Touch and Tool Setter Switches Selection Chart |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator/Head Type* | Barrel Type | Barrel Diameter/Thread | Stroke | Switching Output | Contact Force | Connection Type |
| Straight Touch |  |  |  |  |  |  |  |  |  |
| P085DB-AL | \$148.00 | PDF | $\varnothing 5.5 \mathrm{~mm}$ plunger, SR 1.0 mm | Threaded | M8×0.5 | 3 mm | N.C. | 1N | 3 m [9.84 ft] cable |
| P10DB-AL | \$148.00 | PDF | $\varnothing 8.5 \mathrm{~mm}$ plunger, SR 1.0 mm | Threaded | M10×0.5 | 3 mm | N.C. | 1 N |  |
| P10DA-AL | \$148.00 | PDF | $\varnothing 8.5 \mathrm{~mm}$ plunger, SR 1.0 mm | Threaded | M10×0.5 | 3 mm | N.O. | 1N |  |
| P10DLB-AL | \$149.00 | PDF | $\varnothing 8.5 \mathrm{~mm}$ plunger, SR 1.0 mm | Threaded | M10×0.5 | 10 mm | N.C. | 1 N |  |
| Straight Touch With Ball Bearing |  |  |  |  |  |  |  |  |  |
| P10DHA-TML | \$312.00 | PDF | $\varnothing 2.5 \mathrm{~mm}$ plunger, SR 2.0 mm | Threaded | M14×0.5 | 3 mm | N.O. | 1N | $3 \mathrm{~m}[9.84 \mathrm{ft}]$ cable |
| P10DHB-TML | \$312.00 | PDF | $\varnothing 2.5 \mathrm{~mm}$ plunger, SR 2.0 mm | Threaded | M14×0.5 | 3 mm | N.C. | 1 N |  |
| P10DHLTB-TML | \$343.00 | PDF | $\varnothing 2.5 \mathrm{~mm}$ plunger, SR 2.0 mm | Threaded | M14×0.5 | 10 mm | N.C. | 1 N |  |

* $\varnothing$ = diameter, SR = surface radius
-xL: LED indicator (mounted in cable 120 mm from the switch)



## Precision Limit Switches

## High Precision Touch and Tool Setter Switches

| High Precision Touch and Tool Setter Switches Specifications |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Series | P08 | P10 | PDH | PDHL |
| Environmental |  |  |  |  |
| Degree of Protection | IP67 |  |  |  |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176{ }^{\circ} \mathrm{F}$ ] (Ice-free) |  |  |  |
| Mechanical Ratings |  |  |  |  |
| Enclosure Material | 303 Stainless Steel |  |  |  |
| Pretravel | 0* | P10DA: 0.2 mm P10DB: 0* |  | 0* |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | $4 \mathrm{~N} \cdot \mathrm{~m}(2.95 \mathrm{lb} \cdot \mathrm{ft})$ | $8 \mathrm{~N} \cdot \mathrm{~m}(5.90 \mathrm{lb} \cdot \mathrm{ft})$ | $10 \mathrm{~N} \cdot \mathrm{~m}(7.38 \mathrm{lb} \cdot \mathrm{ft})$ |  |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |  |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |  |  |
| Repeat Accuracy | Both On-Off, Off-On: 0.0005 mm (range)** |  |  |  |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm} /$ minute |  |  |  |
| Electrical Ratings |  |  |  |  |
| Contact Life | 3 million operations |  |  |  |
| Contact Voltage | 5-24VDC |  |  |  |
| Steady Current Rating | 10 mA or less |  |  |  |
| Max In-rush Current Rating | 10 mA (limit current to protect LED indicator) |  |  |  |
| Connection Type | Cable: 3 m Oil resistant $\varnothing 5 / 2$ cores (P08: $\varnothing 4 / 2$ cores), tensile strength 30 N , minimum bending R7, 20AW |  |  |  |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |  |  |

* Adjust the installed location of the switch by the signal switching point.
${ }^{\text {** }}$ At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.


## Circuit Diagrams

Normally open (N.O.)


LED Normally Off

Normally closed (N.C.)


LED Normally On

## Precision Limit Switches

## Ball Plunger Limit Switches

- Indexing positioning ball plunger combined with touch switch for confirmation signal
- Dual function reduces number of components required
- 10 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- Angled/Sliding Touch
- Higher contact force ideal for indexing


O indicates correct target approach and orientation. X indicates approach and orientation that should be avoided.

| Ball Plunger Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator/Head Type* | $\begin{aligned} & \text { Barrel } \\ & \text { Type } \end{aligned}$ | Barrel Diameter/ Thread** | Stroke | Switching Output | Contact Force | Connection Type | Photo |
| Indexing/Angled/Sliding Touch |  |  |  |  |  |  |  |  |  |  |
| BP060A-L | \$55.00 | PDF | ø 3mm ball | Threaded | $\varnothing$ M6×1.0 | 0.8 mm | N.O. | $\begin{gathered} 8 \mathrm{~N} \\ (\mathrm{Max} .13 \mathrm{~N}) \end{gathered}$ | Cable, 2 m length | A |
| BP060A-LF | \$55.00 | PDF |  |  |  |  |  | 1 N |  |  |
| BP080A-L | \$66.00 | PDF | $\varnothing 4 \mathrm{~mm}$ ball |  | $\varnothing \mathrm{M} 8 \times 1.25$ | 1 mm |  | 8-16 N |  | B |
| BP080A-LF | \$66.00 | PDF |  |  |  |  |  | 1 N |  | C |
| BP100A-L | \$69.00 | PDF | $\varnothing 5 \mathrm{~mm}$ ball |  | $\emptyset \mathrm{M} 10 \times 1.5$ | 1.2 mm |  | 10-20 N |  | D |
| BP100A-LF | \$69.00 | PDF |  |  |  |  |  | 1N |  | E |
| BP4SWA | \$78.00 | PDF | Ø 3mm ball | Smooth | $\varnothing 4 \mathrm{~mm}$ | 0.8 mm |  |  | Core wire, | F |
| BP5MWA | \$73.00 | PDF |  | Threaded | M5 $\times 0.5$ | 1 mm |  |  | 0.5 m length | G |

* $\varnothing$ = diameter
-L: LED indicator (mounted in cable 120 mm from the switch)



## Precision Limit Switches Specifications

## Ball Plunger Limit Switches Specifications

| Series | BP060A | BP080A | BP100A | BP4SWA | BP5MWA |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Environmental |  |  |  |  |  |
| Degree of Protection | IP40 |  |  |  |  |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176{ }^{\circ} \mathrm{F}$ ] (Ice-free) |  |  |  |  |
| Mechanical Ratings |  |  |  |  |  |
| Enclosure Material | 303 Stainless Steel |  |  |  |  |
| Pretravel | 0.3 mm |  |  |  |  |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | See Torque Limit Figure |  |  | NA | $1 \mathrm{~N} \cdot \mathrm{~m}$ |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |  |  |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |  |  |  |
| Repeat Accuracy | Both On-Off, Off-On: 0.01 mm (range)(axial direction)* |  |  |  |  |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm} /$ minute |  |  |  |  |
| Electrical Ratings |  |  |  |  |  |
| Contact Life | 3 million operations |  |  | 1 million operations | 3 million operations |
| Contact Voltage | 5-24VDC |  |  |  |  |
| Steady Current Rating | 10 mA or less |  |  |  |  |
| Max In-rush Current Rating | 10 mA (limit current to protect LED indicator) |  |  | 20 mA |  |
| Connection Type | Cable: 2 m Oil resistant $\varnothing 2.8 / 2$ cores, Tensile strength 30N, minimum bending R7. |  |  | Core wire cable: $0.5 \mathrm{~m}(\times 2)$, Oil resistant, $\varnothing 0.66$, Tensile strength 15 N |  |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |  | N/A |  |

*At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.

## Circuit Diagrams

| Without LED | With LED |
| :---: | :---: |
| Normally open (N.O.) | Normally open (N.O.) |
| OBrown |  |
| OBlue | LED Normally Off |

Torque Limits


Tightening torque for case screws and nuts

| Applicable model | L 1 |  | L 2 |  | L3 |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | length | Tightening torque | length | Tightening torque | length | Tightening torque |
| BP060A | 6.5 | $2.5 \mathrm{~N} \cdot \mathrm{~m}$ | 15 | $5 \mathrm{~N} \cdot \mathrm{~m}$ | 10.5 | $2.5 \mathrm{~N} \cdot \mathrm{~m}$ |
| BP080A | 8 | $5 \mathrm{~N} \cdot \mathrm{~m}$ | 21.5 | $10 \mathrm{~N} \cdot \mathrm{~m}$ | 5.5 | $5 \mathrm{~N} \cdot \mathrm{~m}$ |
| BP100A | 6.5 | $15 \mathrm{~N} \cdot \mathrm{~m}$ | 22.5 | $25 \mathrm{~N} \cdot \mathrm{~m}$ | 9 | $15 \mathrm{~N} \cdot \mathrm{~m}$ |

Caution
Use the lower torque (i.e. torque corresponding to L1 and L3) while tightening the bolt between lengths L1 and L2 or L2 and L3 in the picture. Please make sure to use a locknut if the bolt is likely to shift in position due to the vibrational impacts.

## Precision Limit Switches

## Stopper Bolt Precision Limit Switches

## Overview

Stopper bolt precision limit switches incorporate a mechanical stop along with the limit switch function, eliminating the need for a separate mechanical stop in many situations. They can also absorb the highimpact forces required to stop a load.

## Features

- 2 tasks with one device
- Housing a high-accuracy built-in switch in a stopper bolt
- Provides higher contact force ideal for indexing/ positioning
- 10 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- No movement differential
- Stainless steel

O indicates correct target approach
and orientation.

X indicates approach and orientation that should be avoided.

Stopper Bolt Limit Switches can reduce parts count



Stopper Bolt Precision Limit Switches Selection Chart

| Part Number | Price | Drawing Link | Actuator/Head Type* | Barrel Type | Barrel Diameter/Thread | Stroke | Switching Output | Contact Force | Connection Type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| STP100UA-L | \$82.00 | PDF | $\varnothing 5.5 \mathrm{~mm}$ plunger with upward cover | Threaded | M10×1.5 | 0.7 mm | N.O. | 4 N | $\begin{gathered} 2 \mathrm{~m}[6.56 \mathrm{ft}] \\ \text { cable } \end{gathered}$ |
| STP100DA-L | \$82.00 | PDF | $\emptyset 5.5 \mathrm{~mm}$ plunger with downward cover | Threaded | M10×1.5 | 0.7 mm | N.O. | 4N |  |
| STS060PA-L | \$50.00 | PDF | $\varnothing 1.5 \mathrm{~mm}$ plunger | Threaded | M6x1.0 | 0.7 mm | N.O. | 2 N |  |
| STS080PA-L | \$66.00 | PDF | $\varnothing 1.5 \mathrm{~mm}$ plunger | Threaded | M $8 \times 1.25$ | 0.7 mm | N.O. | 2 N |  |
| STS100PA-L | \$69.00 | PDF | $\varnothing 1.5 \mathrm{~mm}$ plunger | Threaded | M10×1.5 | 0.7 mm | N.O. | 2 N |  |
| STE060PA-L | \$54.00 | PDF | $\varnothing 1.5 \mathrm{~mm}$ plunger | Threaded | M6x1.0 | 0.7 mm | N.O. | 2 N |  |
| STE080PA-L | \$72.00 | PDF | $\varnothing 1.5 \mathrm{~mm}$ plunger | Threaded | M $8 \times 1.25$ | 0.7 mm | N.O. | 2 N |  |
| STE100PA-L | \$72.00 | PDF | $\varnothing 1.5 \mathrm{~mm}$ plunger | Threaded | M10×1.5 | 0.7 mm | N.O. | 2 N |  |

* $\varnothing$ = diameter


STS Series (Straight Stopper Bolt)


STE Series (Hexagonal Stopper Bolt)


STE100PA-L

## Precision Limit Switches Specifications

| Stopper Bolt Precision Limit Switchas Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| Series | STP | STS | STE |
| Environmental |  |  |  |
| Degree of Protection | IP67** |  |  |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176^{\circ} \mathrm{F}$ ] (Ice-free) |  |  |
| Mechanical Ratings |  |  |  |
| Enclosure Material | Stainless steel |  |  |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | See Torque Limit Figure |  |  |
| Oscillation | $10-55 \mathrm{~Hz}$ total amplitude 1.5 for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |  |
| Repeat Accuracy | Both On-Off, Off-On/ 0.01 (range) <br> (At operating speed $50-200 \mathrm{~mm} / \mathrm{min}$ ) ${ }^{*} 2$ |  |  |
| Recommended Minimum Operating Speed | 10 mm (0.394 in)/minute |  |  |
| Withstand Load | 5000N |  |  |
| Electrical Ratings |  |  |  |
| Contact Life | 10 million (No bungle caused by vibration and use under contact rating) |  |  |
| Impact resistance | 0.4 J |  |  |
| Contact Voltage | 5-24VDC |  |  |
| Steady Current Rating | 10 mA or less |  |  |
| Max In-rush Current Rating | 20 mA |  |  |
| Connection Type | Standard length 2 m [ 6.56 ft$]$ oil resistant $2.8 / 2$ cores, 26AWG Tensile strength 30 N , minimum bending R7 |  |  |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |  |

* At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.
${ }^{* *}$ At normal temperature $\left(0-80^{\circ} \mathrm{C}\left[32-176^{\circ} \mathrm{F}\right]\right)$.


## Circuit Diagram



## Torque Limits

| Applicable models | Tightening torque | STS060PA- |  |
| :---: | :---: | :---: | :---: |
| STS060PA-L | L1: $4 \mathrm{~N} \cdot \mathrm{~m}[2.95 \mathrm{lb} \cdot \mathrm{ft}]$ L2: $2.5 \mathrm{~N} \cdot \mathrm{~m}[1.84 \mathrm{lb} \cdot \mathrm{ft}]$ | $\text { - }----\theta$ |  |
| STE060PA-L |  |  |  |
| STS080PA-L | $10 \mathrm{~N} \cdot \mathrm{~m}[7.38 \mathrm{lb}$-ft] |  |  |
| STE080PA-L | $10 \mathrm{~N} \cdot \mathrm{~m}[7.38 \mathrm{lb}$ ¢ft] |  |  |
| STS100PA-L | $25 \mathrm{~N} \cdot \mathrm{~m}[18.44 \mathrm{lb} \cdot \mathrm{ft}]$ | L1 | $\xrightarrow{\mathrm{L} 1} \xrightarrow{+}$ |
| STE100PA-L | $25 \mathrm{~N} \cdot \mathrm{~m}$ [18.44 lb ft] |  |  |
| STP100UA-L | $25 \mathrm{~N} \cdot \mathrm{~m}$ [18.44 lboft] | .. |  |
| STP100DA-L | $25 \mathrm{~N} \cdot \mathrm{~m}$ [18.44 lb ft$]$ |  |  |

STE060PA


## Precision Limit Switches

## Low Contact Force Limit Switches: CSFN / CS / CSJ

- 0.1 N and 0.5 N contact force
- 5 micron ( $\mu \mathrm{m}$ ) and 10 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- Stainless steel housing
- Metal bearing
- Straight-touch and straight needle touch available

Low Contact Force Straight Touch


O indicates correct target approach and orientation.

X indicates approach and orientation that should be avoided.

CSFN105A-H6X must be mounted downward

Detects presence of HDD discs


## Low Contact Force Limit Switches Selection Chart

| Part Number | Price | Drawing Link | Actuator/ Head Type* | Barrel Type | Barrel Diameter/Thread* | Stroke | Switching Output | Contact Force | Connection Type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Low Contact Force, Metal Bearing, Downward Mounting Only |  |  |  |  |  |  |  |  |  |
| CSFN105A-H6X | \$46.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger SR 1.5 mm [0.059 in] | Threaded | M10x0.5 | 2 mm [0.079 in] | N.O. NPN | 0.1 N | $3 \mathrm{~m}[9.84 \mathrm{ft}]$ cable |

Low Contact Force, Straight Touch, Metal Bearing

| CS067A-LG | \$61.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger SR 1.5 mm [0.059 in] | Threaded | M6x0.75 | 2.8 mm [0.110 in] | N.O. | 0.5 N | 3 m [9.84 ft] cable |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |

Low Contact Force, Straight Touch, Needle Contact

| CSJ055A-CG | \$53.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger SR 1.5 mm [0.059 in] | Threaded | M5x0.5 | 2.8 mm [0.110 in] | N.O. | 0.5 N | $3 \mathrm{~m}[9.84 \mathrm{ft}]$ cable |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |

## $\varnothing$ = diameter, SR = surface radius

* Must be mounted in a downward direction


CSFN105A-H6X


CS067A-LG


CSJ055A-CG

## Precision Limit Switches

| Low Contact Force Limit Switches Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| Series | CSFN Metal Bearing | CS Custom Metal Bearing | CSJ Custom Needle Contact |
| Environmental |  |  |  |
| Degree of Protection | IP40 | IP65 |  |
| Temperature Range | Operating: 0 to $60^{\circ} \mathrm{C}$ [32 to $140^{\circ} \mathrm{F}$ ] (Ice-free) | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176{ }^{\circ} \mathrm{F}$ ] (Ice-free) |  |
| Mechanical Ratings |  |  |  |
| Enclosure Material | Stainless Steel (mounting nuts are Ni-plated brass) |  |  |
| Pretravel | 0.4 mm [0.016 in] | 0.3 mm [0.012 in] |  |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | $4 \mathrm{~N} \circ \mathrm{~m}[2.95 \mathrm{lb} \circ \mathrm{ft}]$ | $2 \mathrm{~N} \cdot \mathrm{~m}[1.48 \mathrm{lb} \cdot \mathrm{ft}]$ | N/A |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |  |
| Repeat Accuracy | 0.01 mm (10 micron [ $\mu \mathrm{m}]$ ) | 0.005 mm ( 5 micron [ $\mu \mathrm{m}$ ]) |  |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm}(0.394 \mathrm{in}) /$ minute |  |  |
| Electrical Ratings |  |  |  |
| Contact Life | 10 million operations |  |  |
| Contact Voltage | 12-24VDC | 5-24VDC |  |
| Steady Current Rating | 10 mA or less |  |  |
| Max In-rush Current Rating | 10 mA (limit current to protect LED indicator) |  |  |
| Connection Type | Cable: 3m PVC (polyvinyl chloride) oil resistant $\varnothing 4 / 3$ cores, 30AWG Tensile strength 30 N , minimum bending R 7 | Cable: 3 m P oil resistant Tensi minim | vinyl chloride) <br> cores, 26AWG <br> th 30N <br> ding R7 |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |  |

* At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm}(0.393 \mathrm{in}) / \mathrm{min}$ is not recommended.


## Circuit Diagrams



## Precision Limit Switches

## 90-Degree Straight Touch Limit Switches

- Slim design
- 90-degree cable orientation
- Long-stroke models available
- 5 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- Stainless steel housing
- Metal bearing
- Straight-touch and straight needle touch available

90-Degree Straight Touch


O indicates correct target approach and orientation.

X indicates approach and orientation that should be avoided.

| 90-Degree Straight Touch Limit Switches Selection Chart |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator/ Head Type* | Barrel <br> Type | Barrel Diameter/Thread* | Stroke | Switching Output | Contact Force | Connection Type |
| CS065A-LR | \$67.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [ 0.079 in$]$ plunger SR 1.5 mm [ 0.059 in$]$ | Threaded | M6x0.5 | $2.8 \mathrm{~mm}[0.110 \mathrm{in}]$ | N.O. | 1 N | $3 \mathrm{~m}[9.84 \mathrm{ft}]$ cable |
| CS067A-BLR | \$67.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger $\varnothing 4 \mathrm{~mm}$ [0.016 in] flat | Threaded | M6x0.75 | 2.8 mm [0.110 in] | N.O. | 1 N |  |
| CS067A-LR | \$65.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger SR 1.5 mm [0.059 in] | Threaded | M6x0.75 | 2.8 mm [0.110 in] | N.O. | 1 N |  |
| CS067B-LR | \$65.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger SR 1.5 mm [ 0.059 in ] | Threaded | M6x0.75 | 2.8 mm [0.110 in] | N.C. | 1 N |  |
| CS087A-LR | \$65.00 | PDF | $\varnothing 3.5 \mathrm{~mm}[0.138 \mathrm{in}]$ plunger SR 3 mm [0.118 in] | Threaded | M8x0.5 | 2.8 mm [0.110 in] | N.O. | 1N |  |
| CSJ055A-LR | \$59.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger SR 1.5 mm [ 0.059 in$]$ | Threaded | M5x0.5 | 2.8 mm [0.110 in] | N.O. | 1 N |  |
| CSJS50A-LR | \$59.00 | PDF | $\varnothing 2 \mathrm{~mm}$ [0.079 in] plunger SR 1.5 mm [ 0.059 in ] | Smooth | $\varnothing 5$ | $2.8 \mathrm{~mm}[0.110 \mathrm{in}]$ | N.O. | 1 N |  |
| CSK087A-LR | \$64.00 | PDF | $\varnothing 3.5 \mathrm{~mm}[0.138 \mathrm{in}]$ plunger SR 3 mm [0.118 in] | Threaded | M8x0.75 | 5 mm [0.197 in] | N.O. | 1 N |  |
| CSK087B-LR | \$64.00 | PDF | $\varnothing 3.5 \mathrm{~mm}[0.138 \mathrm{in}]$ plunger SR 3 mm [0.118 in] | Threaded | M8×0.75 | 5 mm [0.197 in] | N.C. | 1N |  |

* $\varnothing$ = diameter, SR = surface radius



CS067A-LR


## Precision Limit Switches Specifications

| 90-Degree Straight Touch Limit Switches Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| Series | cs | CSJ | CSK |
| Environmental |  |  |  |
| Degree of Protection | IP65 |  |  |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176{ }^{\circ} \mathrm{F}$ ] (Ice-free) |  |  |
| Mechanical Ratings |  |  |  |
| Enclosure Material | Stainless Steel |  |  |
| Pretravel | 0.3 mm |  |  |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | $4 \mathrm{~N} \cdot \mathrm{~m}[2.95 \mathrm{lb}$-ft] | $2 \mathrm{~N} \cdot \mathrm{~m}$ [1.48 Ibft] | $7 \mathrm{~N} \cdot \mathrm{~m}[5.16 \mathrm{lb} \cdot \mathrm{ft}]$ |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |  |
| Repeat Accuracy | 5 micron ( $\mu \mathrm{m}$ ) |  |  |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm} /$ minute |  |  |
| Electrical Ratings |  |  |  |
| Contact Life | 10 million operations |  |  |
| Contact Voltage | 5-24VDC |  |  |
| Steady Current Rating | 10 mA or less |  |  |
| Max In-rush Current Rating | 10 mA (limit current to protect LED indicator) |  |  |
| Connection Type | Cable: 3 m [ 9.84 ff , oil resistant, $\varnothing 2.8 / 2$ cores, tensile strength 30 N [ 6.74 lff ], minimum bending R7, 2-26AWG |  |  |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |  |

*At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.

## Circuit Diagrams



Normally closed (N.C.)


LED Normally On

## Precision Limit Switches

## Sliding Angled Offset Touch Limit Switches

- Metal and plastic hemisphere actuators
- 5 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- Stainless steel housing

Sliding Angled Offset Touch


O indicates correct target approach and orientation.

X indicates approach and orientation that should be avoided.

## Sliding Angled Offiset Touch Limit Switches Selection Chart

| Part Number | Price | Drawing Link | Actuator/ Head Type* | Barrel Type | Barrel Diameter/Thread* | Stroke | Switching Output | Contact Force | Connection Type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CSHP085A-L | \$158.00 | PDF | $\varnothing 4.7$ mm SR 3mm | Threaded | M8×0.5 | $2.8 \mathrm{~mm}[0.110 \mathrm{in}]$ | N.O. | 1N | 2 m [6.56 ft] cable |
| CSHP085B-L | \$158.00 | PDF | $\varnothing 4.7$ mm SR 3mm | Threaded | M8×0.5 | 2.8 mm [0.110 in] | N.C. | 1N | 2 m [6.56 ft] cable |
| CSH121A-AL | \$78.00 | PDF | $\varnothing 10$ hemisphere | Threaded | M12x1 | 2.8 mm [0.110 in] | N.O. | 1.5 N | 2 m [6.56 ft] cable |
| CSH121B-AL | \$81.00 | PDF | $\varnothing 10$ hemisphere | Threaded | M12x1 | 2.8 mm [0.110 in] | N.C. | 1.5 N | 2 m [6.56 ft] cable |
| CSH121A-APL | \$90.00 | PDF | $\varnothing 10$ hemisphere, plastic | Threaded | M12x1 | $2.8 \mathrm{~mm}[0.110 \mathrm{in}]$ | N.O. | 1.5 N | 2 m [6.56 ft] cable |
| CSH121B-APL | \$90.00 | PDF | $\varnothing 10$ hemisphere, plastic | Threaded | M12x1 | $2.8 \mathrm{~mm}[0.110 \mathrm{in}]$ | N.C. | 1.5 N | 2 m [6.56 ft] cable |

* $\varnothing=$ diameter, SR = surface radius



CSH121A-AL


CSH121B-AL

## Precision Limit Switches Specifications



* At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.


## Circuit Diagrams

Normally open (N.O.)


LED Normally Off

Normally closed (N.C.)


LED Normally On

## Precision Limit Switches

## Precision Mini Straight Touch Limit Switches

- Mini size suitable for machines required to be small and for narrow installation space.
- Stroke length ( 1.5 mm )
- 3 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- Stainless steel housing
- Metal bearing


## Precision Mini Touch



O indicates correct target approach and orientation.

X indicates approach and orientation that should be avoided.

| Procision Mini Touch Limit Swhiches Solection Chart |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator/ Head Type* | Barrel Type | Barrel Diameter/Thread* | Stroke | Switching Output | Contact Force | Connection Type |
| CSM105WA | \$57.00 | PDF | $\varnothing 3.5 \mathrm{~mm}$ plunger | Threaded | M10×0.5 | 1.5 mm | N.O. | 1 N | $0.5 \mathrm{~m}[1.64 \mathrm{ft}]$ core wire |
| CSMP105WA | \$60.00 | PDF | 2 mm plunger with boot/ SR 2.5 mm | Threaded | M10×0.5 | 1.5 mm | N.O. | 1N | 0.5 m [1.64 ft] core wire |
| CSM105CA-L | \$62.00 | PDF | $\varnothing 3.5 \mathrm{~mm}$ plunger | Threaded | M10×0.5 | 1.5 mm | N.O. | 1N | 2 m [6.56 ft] cable |
| CSMP105CA-L | \$66.00 | PDF | 2 mm plunger with boot | Threaded | M10×0.5 | 1.5 mm | N.O. | 1N | 2 m [6.56 ft] cable |

* $\varnothing$ = diameter, SR = surface radius
-L: LED indicator (mounted in cable 120 mm from the switch)


CSM105CA-L


CSMP105CA-L

## Precision Limit Switches Specifications

| Precision Mini Touch Limit Switches Specifications |  |  |
| :---: | :---: | :---: |
| Type | Precision Angled | Precision Mini |
| Series | CSM | CSMP |
| Environmental |  |  |
| Degree of Protection | IP65 | IP67 |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176{ }^{\circ} \mathrm{F}$ ] (Ice-free) |  |
| Mechanical Ratings |  |  |
| Enclosure Material | 303 Stainless Steel |  |
| Pretravel | 0.3 mm |  |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | $8 \mathrm{~N} \cdot \mathrm{~m}[5.901 \mathrm{lb}$ •ft] |  |
| Oscillation | 10-55 Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |
| Repeat Accuracy | Both On-Off, Off-On: $0.003 \mathrm{~mm}{ }^{*}$ |  |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm} /$ minute |  |
| Electrical Ratings |  |  |
| Contact Life | 10 million operations |  |
| Contact Voltage | 5-24VDC |  |
| Steady Current Rating | 10 mA or less |  |
| Max In-rush Current Rating | 10 mA (limit current to protect LED indicator) |  |
| Connection Type | Core wire cable, 0.5 m ( $\times 2$ ), oil resistant, $\varnothing 0.6$, tensile strength 15 N , Cable: 2 m , oil resistant $\varnothing 2.8 / 2$ cores, tensile strength 30 N [ 6.74 lbf ], 2-26AWG |  |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |

*At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.

## Circuit Diagrams

| Without LED | With LED |
| :---: | :---: |
| Normally open (N.O.) | Normally open (N.O.) <br> LED Normally Off |
| Normally closed (N.C.) | Normally closed (N.C.) <br> LED Normally On |

## Metrol Precision Limit Switches

## High-Vacuum Resistance Switches

- Can be used in 10-5 PA high-vacuum environments
- Switch body made using low outgassing material and adhesive

High Vacuum Resistance


O indicates correct target approach and orientation.
X indicates approach and orientation that should be avoided.

| Migh-Vacuum Resistance Switches Selection Chart |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Actuator/Head Type* | Barrel Type | Barrel Diameter/ Thread | Stroke | Output Mode | Repeatability | Contact Force | Connection Type | Drawing Link |
| GN-BP5MA | \$320.00 | Angled touch | Threaded | M5x0.5 | $\begin{gathered} 1.0 \mathrm{~mm} \\ {[0.039 \mathrm{in}]} \end{gathered}$ | N.O. | $\begin{gathered} 0.01 \mathrm{~mm} \\ {[0.00039 \mathrm{in}]} \end{gathered}$ | 1N | Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5 m [1.6 ft] core wire, AWG 30 | PDF |
| GN-BP5MA-R | \$326.00 | Angled touch | Threaded | M5x0.5 | $\begin{gathered} 1.0 \mathrm{~mm} \\ {[0.039 \mathrm{in}]} \end{gathered}$ | N.O. | $\begin{gathered} 0.01 \mathrm{~mm} \\ {[0.00039 \mathrm{in}]} \end{gathered}$ | 1N | Cable direction: $90^{\circ}$ Polytetrafluoroethylene (PTFE) 0.5 m [1.6 ft] core wire, AWG 30 | PDF |
| GN-PT5M3A | \$234.00 | Straight touch $\varnothing 1.5 \mathrm{~mm}$ [0.059 in] plunger SR 2mm [0.079 in] | Threaded | M5x0.5 | $\begin{gathered} 1.5 \mathrm{~mm} \\ {[0.059 \mathrm{in}]} \end{gathered}$ | N.O. | $\begin{gathered} 0.003 \mathrm{~mm} \\ {[0.00012 \mathrm{in}]} \end{gathered}$ | 0.5 N | Cable direction: straight Polytetrafluoroethylene (PTFE) $0.5 \mathrm{~m}[1.6 \mathrm{ft}]$ core wire, AWG 30 | PDF |
| GN-PT5M3B | \$234.00 | Straight touch $\varnothing 1.5 \mathrm{~mm}[0.059 \mathrm{in}]$ plunger SR 2mm [0.079 in] | Threaded | M5x0.5 | $\begin{gathered} 1.5 \mathrm{~mm} \\ {[0.059 \mathrm{in}]} \end{gathered}$ | N.C. | $\begin{gathered} 0.003 \mathrm{~mm} \\ {[0.00012 \mathrm{in}]} \end{gathered}$ | 0.5 N | Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5 m [1.6 ft] core wire, AWG 30 | PDF |
| GN-BP161B | \$1,138.00 | Angled touch | Threaded | M16x1 | $\begin{gathered} 2.9 \mathrm{~mm} \\ {[0.114 \mathrm{in}]} \end{gathered}$ | N.C. | $\begin{gathered} 0.01 \mathrm{~mm} \\ {[0.00039 \mathrm{in}]} \end{gathered}$ | 1.5 N | Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5 m [1.6 ft] core wire, AWG 30 | PDF |
| GN-CSK141B | \$1,138.00 | Straight touch | Threaded | M14x1 | $\begin{gathered} 5 \mathrm{~mm} \\ {[0.197} \\ \mathrm{mm}] \\ \hline \end{gathered}$ | N.C. | $\begin{gathered} 0.01 \mathrm{~mm} \\ {[0.00039 \mathrm{in}]} \end{gathered}$ | 0.8 N | Cable direction: straight Polytetrafluoroethylene (PTFE) $0.5 \mathrm{~m}[1.6 \mathrm{ft}]$ core wire, AWG 30 | PDF |

* $\emptyset=$ diameter, SR = surface radius


GN-BP5MA


GN-BP5MA-R


GN-PT5M3A


GN-PT5M3B


GN-BP161B


GN-CSK141B

## Precision Limit Switches Specifications

| High-Vacuum Resistance Switches Specifications |  |
| :---: | :---: |
| Series | GN |
| Environmental |  |
| Compatible Vacuum | $10-5 \mathrm{PA}$ |
| Degree of Protection | IP40 |
| Temperature Range | $120^{\circ} \mathrm{C}\left[248^{\circ} \mathrm{F}\right.$ ( allowable baking temperature) |
| Mechanical Ratings |  |
| Enclosure Material | 304 Stainless Steel |
| Pretravel | $\begin{gathered} 0 \mathrm{~mm} \text { [0in]: }(\text { GN-PT5M3B, } \\ 0.2 \mathrm{~mm} \text { [0.0079 in]: } \\ \text { (GN-BP16141B) }) \\ 0.3 \mathrm{~mm}[0.0118 \mathrm{in}]: \text { (GN-BP5MA, } \text { GN-BP5MA-R, } \end{gathered}$ |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | $1 \mathrm{~N} \cdot \mathrm{~m}[0.73 \mathrm{lb} \cdot \mathrm{ft}]$ |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |
| Electrical Ratings |  |
| Contact Life | 3 million operations |
| Repeat Accuracy** | Both On-Off, Off-On: See Selection Table |
| Recommended Minimum Operating Speed | 10 mm [0.39 in] / minute |
| Contact Voltage | 5-24 VDC |
| Steady Current Rating | 10 mA or less |
| Max In-rush Current Rating | 20 mA |
| Connection Type | 0.5 m [19.69 in] Polytetrafluoroethylene (PTFE) core wire, 2x30AWG |
| Indicating | N/A |

*Adjust the installed location of the switch by the signal switching point.
** At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.

## Circuit Diagrams

Normally open (N.O.)


Normally closed (N.C.)


## Precision Limit Switches

## High Temperature: HT Series

High Temperature HT Series


O indicates correct target approach and orientation. X indicates approach and orientation that should be avoided.

## High Temperature Precision Limit Switches Selection Chart

| Part Number | Price | Actuator/Head Type* | Barrel Type | Barrel Diameter/Thread | Stroke | Switching Output | Contact Force | Connection Type | Drawing Link |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Straight/Precision Touch |  |  |  |  |  |  |  |  |  |
| HT-CS067A | \$235.00 | $\varnothing 2 \mathrm{~mm}$ plunger, SR 1.5 mm [0.059 in] | Threaded | M6×0.75 | 2.8 mm [0.110 in] | N.O. | 1N | $2 \mathrm{~m}[6.56 \mathrm{ft}]$ cable | PDF |
| Indexing/Angled/Sliding Touch/Ball Plunger |  |  |  |  |  |  |  |  |  |
| HT-BP060A | \$214.00 | $\varnothing$ 3mm [0.118 in] ball | Threaded | M6×1.0 | 0.8 mm [0.031 in] | N.O. | $\begin{gathered} \operatorname{Min} 6 \mathrm{~N} \\ \mathrm{Max} 13 \mathrm{~N} \end{gathered}$ | 2 m [6.56 ft] cable | PDF |
| Heat Resistant Stopper Bolt |  |  |  |  |  |  |  |  |  |
| STS060A-HT2 | \$196.00 | 1.5 mm [0.059 in] plunger, 3.4 mm [0.139 in] flat | Threaded | M6×1.0 | 0.7 mm [0.028 in] | N.O. | 1N | 2 m [6.56 ft] cable | PDF |
| STM82A-HT2 | \$192.00 | $\varnothing 3 \mathrm{~mm}$ [0.118 in] plunger with boot | Threaded | M10×0.75 | 0.3 mm [0.012 in] | N.O. | 1N | 2 m [6.56 ft] cable | PDF |

* $\varnothing=$ diameter, SR = surface radius



STM82A-HT2

## Precision Limit Switches Specifications

| High Temperature Precision Limit Switches Specifications |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Part Number | HT-CS067A | HT-BP060A | STSO60A-HT2 | STM82A-HT2 |
| Environmental |  |  |  |  |
| Degree of Protection | IP65** | 1P40** | IP40** | IP65** |
| Temperature Range | Operating: 0 to $200^{\circ} \mathrm{C}\left[32\right.$ to $392^{\circ} \mathrm{F}$ ] (Ice-free) |  |  |  |
| Mechanical Ratings |  |  |  |  |
| Enclosure Material | Stainless Steel |  |  |  |
| Pretravel | 0.3 mm (0.012 in) | $0.5 \mathrm{~mm}[0.020 \mathrm{in}]$ from end face | 0.3 mm [0.012 in] from stopping face | Middle of stroke |
|  |  |  | - | - |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | $4 \mathrm{~N} \cdot \mathrm{~m}$ | L1: $2.5 \mathrm{~N} \cdot \mathrm{~m}$ <br> [1.844 lbft] <br> L2: $5 \mathrm{~N} \cdot \mathrm{~m}$ <br> [3.688 lb•ft] <br> L3: $5 \mathrm{~N} \cdot \mathrm{~m}$ <br> [3.688 lb•ft] | L1: $5 \mathrm{~N} \cdot \mathrm{~m}$ [ $3.688 \mathrm{lb} \cdot \mathrm{ft}$ ] <br> L2: $5 \mathrm{~N} \cdot \mathrm{~m}$ <br> [ $3.688 \mathrm{lb} \cdot \mathrm{ft}$ ] | $\begin{gathered} 10 \mathrm{~N} \cdot \mathrm{~m} \\ {[7.376 \mathrm{lb} \cdot \mathrm{ft}]} \end{gathered}$ |
| Oscillation | 10-55 Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |  |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |  |  |
| Electrical Ratings |  |  |  |  |
| Contact Life | 3 million operations |  |  |  |
| Repeat Accuracy | 0.01 mm [0.00039 in] *** |  |  |  |
| Recommended Minimum Operating Speed | 10 mm [0.394 in]/minute |  |  |  |
| Contact Voltage | 5-24 VDC |  |  |  |
| Steady Current Rating | 10 mA or less |  |  |  |
| Max In-rush Current Rating | 20 mA |  |  |  |
| Connection Type | Cable: $2 \mathrm{~m}[6.56 \mathrm{ft}]$ heat-resistant $\varnothing 2.8$ 2 cores, 24AWG | Cable: $2 \mathrm{~m}[6.56 \mathrm{ft}]$ heat-resistant ø 2.8 2 cores, 24AWG | Cable: $2 \mathrm{~m}[6.56 \mathrm{ft}]$ heat-resistant $\varnothing 2.8$ 2 cores, 26AWG | Cable: $2 \mathrm{~m}[6.56 \mathrm{ft}]$ heat-resistant $\varnothing 2.8$ 2 cores, 26AWG |
| Indicating | N/A |  |  |  |

${ }^{*}$ At operating speed $50-200 \mathrm{~mm}$ [1.97-7.87 in]/minute. Operating speed slower than $10 \mathrm{~mm}[0.39 \mathrm{in}] / \mathrm{min}$ is not recommended.
${ }^{* *}$ At normal temperature ( 0 to $80^{\circ} \mathrm{C}$ [ 32 to $176^{\circ} \mathrm{F}$ ]).

## Circuit Diagrams

Normally open (NO)


## Precision Limit Switches

## High Precision Tool Setter Switches

- Tool setter for blade positioning, wear detection, breakage, etc.
- 0.5 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- No movement differential
- No temperature drift
- Dustproof / water-resistant (IP67)
- LED indicator


O indicates correct target approach and orientation.

X indicates approach and orientation that should be avoided.

| High Precision Touch and ToL Setter Switohes Selection Chart |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator/Head Type* | Barrel Type | Barrel Diameter/ Thread | Stroke | Switching Output | Contact Force | Connection Type |
| P11DDB-DULD | \$186.00 | PDF | $\varnothing 16 \mathrm{~mm}$ plunger, $\varnothing 5 \mathrm{~mm}$ flat | NA | NA | 3 mm | N.C. | 1.5 N | 3 m [9.84 ft] cable |
| P11EDB-DULD | \$186.00 | PDF | $\varnothing 16 \mathrm{~mm}$ plunger, $\varnothing 5 \mathrm{~mm}$ flat | NA | NA | 5 mm | N.C. | 1.5 N | 3 m [9.84 ft] cable |
| P21EDBP-22-28 | \$634.00 | PDF | $\varnothing 18.5 \mathrm{~mm}$ plunger, $\varnothing 10 \mathrm{~mm}$ flat | NA | NA | 5 mm | N.C. | 1.5 N | 5 m [16.40 ft] cable |

* $\varnothing$ = diameter
-xxLD: LED indicator (attached to sensor)



## Precision Limit Switches Specifications

| High Precision Touch and Tool Sctier Switches Specifications |  |  |
| :---: | :---: | :---: |
| Series | P11 | P21 |
| Environmental |  |  |
| Degree of Protection | IP67 |  |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176^{\circ} \mathrm{F}$ ] (Ice-free) |  |
| Mechanical Ratings |  |  |
| Enclosure Material | Aluminum |  |
| Pretravel | 0 * | 1st signal $0^{*}$, 2nd signal 2.5 mm (0.098 in) |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | N/A |  |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |  |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |  |
| Repeat Accuracy | Both On-Off, Off-On: 0.0005 mm (range)** |  |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm} /$ minute |  |
| Electrical Ratings |  |  |
| Contact Life | 3 million operations |  |
| Contact Voltage | 5-24VDC |  |
| Steady Current Rating | 10 mA or less |  |
| Max In-rush Current Rating | 10 mA (limit current to protect LED indicator) |  |
| Connection Type | Cable: 3 m ( 9.84 ft ) oil resistant $\varnothing 5 / 2$ cores (P08: $\varnothing 4 / 2$ cores) Tensile strength 30N, minimum bending R7, 30AWG | Cable: 5 m ( 16.40 ft ) oil resistant $\varnothing 5 / 2$ cores (P08: Ø4/2 cores), Tensile strength 30 N , minimum bending R7, 30AWG |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |  |

* Adjust the installed location of the switch by the signal switching point.
${ }^{\text {** }}$ At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.


## Circuit Diagrams

| Without LED | With LED |
| :---: | :---: |
| Normally closed (N.C.) | Brown |
| Oormally closed (N.C.) |  |
| LED Normally On |  |

## P21 Wiring

| With LED |
| :--- |
| 2-signal type (P21) |
| First Signal |
| Normally closed (N.C.) |
| Second Signal |
| Normally closed (N.C.) |

## Precision Limit Switches

## Mini Stopper Precision Limit Switches

## Overview

Precision stopper limit switches incorporate a mechanical stop and a limit switch function in a single switch, eliminating the need for a separate stop.

## Features

- Mini Stopper switch
- Provides higher contact force ideal for indexing/positioning
- 10 micron ( $\mu \mathrm{m}$ ) repeat accuracy
- No movement differential
- No temperature drift


## Straight Touch

|  |
| :---: |
|  |

O indicates correct target approach and orientation. $X$ indicates approach and orientation that should be avoided.

Mini Stopper Precision Limit Switches Selection Chart

| Part Number | Price | Drawing Link | Actuator/Head Type* | Barrel Type | Barrel Diameter/ Thread | Stroke | Switching Output | Contact Force | Connection Type | Photo |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| STM13A | \$47.50 | PDF | $\varnothing$ 3mm plunger | smooth | $\varnothing 10$ | 0.5 mm | N.O. | 0.8 N | Core wire, 0.5 m length | A |
| STM63A | \$62.00 | PDF | $\varnothing$ 3mm plunger with boot | smooth | $\varnothing 11$ | 0.3 mm |  | 1 N |  | B |
| STM31A | \$49.00 | PDF | $\varnothing$ 3mm plunger | threaded | M10×0.75 | 0.5 mm |  | 0.8 N |  | C |
| STM81A | \$66.00 | PDF | $\varnothing$ 3mm plunger with boot | threaded | M10×0.75 | 0.3 mm |  | 1 N |  | D |
| STM33A | \$52.00 | PDF | $\varnothing$ 3mm plunger | threaded | M10×1.5 | 0.5 mm |  | 0.8 N |  | E |
| STM83A | \$62.00 | PDF | $\varnothing$ 3mm plunger with boot | threaded | M10×1.5 | 0.3 mm |  | 1 N |  | F |
| STM14A-L | \$66.00 | PDF | $\varnothing$ 3mm plunger | smooth | $\varnothing 10$ | 0.5 mm |  | 0.8 N | Cable, $2 m$ length | G |
| STM64A-L | \$78.00 | PDF | $\varnothing$ 3mm plunger with boot | smooth | $\varnothing 11$ | 0.3 mm |  | 1 N |  | H |
| STM32A-L | \$72.00 | PDF | $\varnothing$ 3mm plunger | threaded | M10×0.75 | 0.5 mm |  | 0.8 N |  | I |
| STM82A-L | \$84.00 | PDF | $\varnothing$ 3mm plunger with boot | threaded | M10×0.75 | 0.3 mm |  | 1 N |  | J |
| STM34A-L | \$73.00 | PDF | $\varnothing$ 3mm plunger | threaded | M10×1.5 | 0.5 mm |  | 0.8 N |  | K |
| STM84A-L | \$88.00 | PDF | $\varnothing 3 \mathrm{~mm}$ plunger with boot | threaded | M10×1.5 | 0.3 mm |  | 1 N |  | L |

[^2]

A


B


D

## Precision Limit Switches

Mini Stopper: STM Series


E


I


G


K


## Precision Limit Switches Specifications

| Mini Stopper Precision Limit Switches Specifications |  |
| :---: | :---: |
| Series | STM |
| Environmental |  |
| Degree of Protection | $\begin{aligned} & \text { IP44 (STM13A, STM31A, STM33A, STM14A-L, STM32A-L, STM34A-L) } \\ & \text { IP67 (STM63A, STM81A, STM83A, STM64A-L, STM82A-L, }, \text { STM84A-L) } \end{aligned}$ |
| Temperature Range | Operating: 0 to $80^{\circ} \mathrm{C}$ [32 to $176{ }^{\circ} \mathrm{F}$ ] (Ice-free) |
| Mechanical Ratings |  |
| Enclosure Material | Stainless Steel |
| Torque (for nuts on threaded barrels, set screws on smooth barrels) | 10Nm |
| Oscillation | 10-55Hz total amplitude 1.5 for $X, Y, Z$ each direction |
| Impact | $300 \mathrm{~m} / \mathrm{s}^{2}$ for $\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ each direction |
| Withstand Load | 3000 N |
| Repeat Accuracy | Both $\mathrm{On} \rightarrow \mathrm{Off}, \mathrm{Off} \rightarrow \mathrm{On} / 0.01$ (range) (At operating speed $50-200 \mathrm{~mm} / \mathrm{min}$ ) *2 |
| Recommended Minimum Operating Speed | $10 \mathrm{~mm} /$ minute |
| Electrical Ratings |  |
| Contact Life | 10 million (No bungle caused by vibration and use under contact rating) |
| Impact Resistance | 0.2 J |
| Contact Voltage | 5-24VDC |
| Steady Current Rating | 10 mA or less |
| Max In-rush Current Rating | 20 mA |
| Connection Type | Standard length 2 m or 0.5 m Oil resistant 2.8 / 2 cores, Tensile strength 30 N , minimum bending R7 |
| Indicating | -L: LED indicator (mounted in cable 120 mm from the switch) |

*At operating speed $50-200 \mathrm{~mm} /$ minute. Operating speed slower than $10 \mathrm{~mm} / \mathrm{min}$ is not recommended.
** At normal temperature ( $0-80^{\circ} \mathrm{C}\left[32-176^{\circ} \mathrm{F}\right]$ ).

## Circuit Diagrams

| Without LED | With LED |
| :---: | :---: |
| Normally open (N.O.) | Normally open (N.O.) |
| OBrown |  |
| OBlue |  |
|  | LED Normally Off |

## si IDEM Micro Switches

## Plunger Series Limit Switches

- A high precision, 15A-rated micro switch available in a wide variety of styles
- Plunger series models are available with a choice of actuator types including pin plunger, spring plunger, and roller plunger
- Panel mount options available
- Screw terminals for easy connection
- Suitable for a wide range of operating conditions
- Terminal enclosure available

| \|DEM Plunger Series Micro Switches |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Snap Action Contacts | Pretravel (max) | Over Travel | Force to Operate Contacts |
| 176101-1 | \$10.50 | PDF | Metal pin plunger | 1 N.O., 1 N.C. | $\begin{gathered} 0.4 \mathrm{~mm} \\ {[0.016 \mathrm{in}]} \end{gathered}$ | 0.13 mm [0.005 in] | $\begin{gathered} 250-350 \mathrm{~g} \\ {[0.55-0.77 \mathrm{lb}]} \end{gathered}$ |
| 176101-5 | \$47.00 | PDF | Metal pin plunger (pack of 5) |  |  |  |  |
| 176104-1 | \$12.00 | PDF | Metal pin plunger long | 1 N.O., 1 N.C. | $\begin{gathered} 0.4 \mathrm{~mm} \\ {[0.016 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 1.6 \mathrm{~mm} \\ {[0.063 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 250-350 \mathrm{~g} \\ {[0.55-0.77 \mathrm{lb}]} \end{gathered}$ |
| 176104-5 | \$54.00 | PDF | Metal pin plunger long (pack of 5) |  |  |  |  |
| 176105-1 | \$12.50 | PDF | Metal plunger | 1 N.O., 1 N.C. | $\begin{gathered} 0.4 \mathrm{~mm} \\ {[0.016 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 1.6 \mathrm{~mm} \\ {[0.063 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 250-350 \mathrm{~g} \\ {[0.55-0.77 \mathrm{lb}]} \end{gathered}$ |
| 176105-5 | \$55.00 | PDF | Metal plunger (pack of 5) |  |  |  |  |
| 176106-1 | \$15.00 | PDF | Metal plunger with fixing nuts | 1 N.O., 1 N.C. | $\begin{gathered} 0.4 \mathrm{~mm} \\ {[0.016 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 5.5 \mathrm{~mm} \\ {[0.217 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 250-350 \mathrm{~g} \\ {[0.55-0.77 \mathrm{lb}]} \end{gathered}$ |
| 176106-5 | \$67.00 | PDF | Metal plunger with fixing nuts (pack of 5) |  |  |  |  |
| 176107-1 | \$18.50 | PDF | Metal plunger with metal roller and fixing nuts | 1 N.O., 1 N.C. | $\begin{gathered} 0.4 \mathrm{~mm} \\ {[0.016 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 3.58 \mathrm{~mm} \\ {[0.141 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 250-350 \mathrm{~g} \\ {[0.55-0.77 \mathrm{lb}]} \end{gathered}$ |
| 176107-5 | \$87.00 | PDF | Metal plunger with metal roller and fixing nuts (pack of 5) |  |  |  |  |
| 176108-1 | \$18.50 | PDF | Metal plunger with metal cross roller and fixing nuts | 1 N.O., 1 N.C. | 0.4 mm$[0.016 \mathrm{in}]$ | $\begin{aligned} & 3.58 \mathrm{~mm} \\ & {[0.141 \mathrm{in}]} \end{aligned}$ | $\begin{gathered} 250-350 \mathrm{~g} \\ {[0.55-0.77 \mathrm{lb}]} \end{gathered}$ |
| 176108-5 | \$87.00 | PDF | Metal plunger with metal cross roller and fixing nuts (pack of 5) |  |  |  |  |


| $\mathbf{1 7 6 0 0 0 - 1}$ | $\$ 1.75$ | $\underline{\text { PDF }}$ | Terminal enclosure for IDEM micro limit switches. Polyvinyl chloride (PVC). |
| :--- | :--- | :---: | :---: |
| $\mathbf{1 7 6 0 0 0 - 5}$ | $\$ 8.75$ | $\underline{\text { PDF }}$ | Terminal enclosure for IDEM micro limit switches (pack of 5). Polyvinyl chloride (PVC). |



176101-1


176104-1


176105-1


176106-1


176107-1


176108-1


## IDEM Micro Switches, Plunger Series

## Operating Characteristics

## Metal Pin Plunger (176101)



| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $250-350 \mathrm{~g}[0.55-0.77 \mathrm{lb}]$ |
| Release Force <br> (min) | $114 \mathrm{~g}[0.25 \mathrm{lb}]$ |
| Pre-Travel (max) | $0.4 \mathrm{~mm}[0.016 \mathrm{in}]$ |
| Over-Travel <br> $(\mathbf{m i n})$ | $0.13 \mathrm{~mm}[0.005 \mathrm{in}]$ |
| MD (max) | $0.05 \mathrm{~mm}[0.002 \mathrm{in}]$ |
| Operating <br> Position | $15.9 \pm 0.4 \mathrm{~mm}[0.626 \pm 0.016 \mathrm{in}]$ |

Metal Plunger With Fixing Nuts (176106)


| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $250-350 \mathrm{~g}[0.55-0.77 \mathrm{lb}]$ |
| Release Force <br> (min) | $114 \mathrm{~g}[0.25 \mathrm{lb}]$ |
| Pre-Travel (max) | $0.4 \mathrm{~mm}[0.016 \mathrm{in}]$ |
| Over-Travel <br> $(\boldsymbol{m i n})$ | $5.5 \mathrm{~mm}[0.217 \mathrm{in}]$ |
| MD (max) | $0.05 \mathrm{~mm}[0.002 \mathrm{in}]$ |
| Operating <br> Position | $21.8 \pm 0.8 \mathrm{~mm}[0.858 \pm 0.032 \mathrm{in}]$ |

Metal Pin Plunger Long (176104)


Operating Characteristics

| Operating Force | $250-350 \mathrm{~g}[0.55-0.77 \mathrm{lb}]$ |
| :--- | :---: |
| Release Force <br> (min) | $114 \mathrm{~g}[0.25 \mathrm{lb}]$ |
| Pre-Travel (max) | $0.4 \mathrm{~mm}[0.016 \mathrm{in}]$ |
| Over-Travel <br> (min) | $1.6 \mathrm{~mm}[0.063 \mathrm{in}]$ |
| MD (max) | $0.5 \mathrm{~mm}[0.020 \mathrm{in}]$ |
| Operating <br> Position | $28.2 \pm 0.5 \mathrm{~mm}[1.110 \pm 0.020 \mathrm{in}]$ |

Metal Plunger (176105)


| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $250-350 \mathrm{~g}[0.55-0.77 \mathrm{lb}]$ |
| Release Force <br> (min) | $114 \mathrm{~g}[0.25 \mathrm{lb}]$ |
| Pre-Travel (max) | $0.4 \mathrm{~mm}[0.016 \mathrm{in}]$ |
| Over-Travel <br> $(\mathbf{m i n})$ | $1.6 \mathrm{~mm}[0.063 \mathrm{in}]$ |
| MD (max) | $0.05 \mathrm{~mm}[0.002 \mathrm{in}]$ |
| Operating <br> Position | $21.5 \pm 0.5 \mathrm{~mm}[0.846 \pm 0.020 \mathrm{in}]$ |

Metal Plunger With Metal Roller and Fixing Nuts (176107)


| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $250-350 \mathrm{~g}[0.55-0.77 \mathrm{lb}]$ |
| Release Force <br> (min) | $114 \mathrm{~g}[0.25 \mathrm{lb}]$ |
| Pre-Travel (max) | $0.4 \mathrm{~mm}[0.016 \mathrm{in}]$ |
| Over-Travel <br> (min) | $3.58 \mathrm{~mm}[0.141 \mathrm{in}]$ |
| MD (max) | $0.05 \mathrm{~mm}[0.002 \mathrm{in}]$ |
| Operating <br> Position | $33.4 \pm 1.2 \mathrm{~mm}[1.315 \pm 0.047 \mathrm{in}]$ |

## Operating Characteristics definitions:

- Operating Force: Force required to cause "snap."
- Release Force: Force still applied to plunger or lever when the contacts snap back from the operated position.
- Pre-Travel: Distance from free position to operating position.
- Over-Travel: The extra travel for the plunger or lever to travel safely beyond the operating position.
- MD (Max): Maximum differential (plunger or lever travel from the point where the contacts snap to the point where they snap back).
- FP (max): Extra distance relative to mounting holes that the plunger or lever travels to the snap position, including loose flex.
- Operating Position: Distance relative to mounting holes that the plunger or lever travels to the snap position.


# IDEM Micro Switches, Plunger Series Operating Characteristics (continued) 

Metal Plunger With Cross Roller and Fixing Nuts (176108)


| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $250-350 \mathrm{~g}[0.55-0.77 \mathrm{lb}]$ |
| Release Force <br> (min) | $114 \mathrm{~g}[0.25 \mathrm{lb}]$ |
| Pre-Travel (max) | $0.4 \mathrm{~mm}[0.016 \mathrm{in}]$ |
| Over-Travel <br> (min) | $3.58 \mathrm{~mm}[0.141 \mathrm{in}]$ |
| MD (max) | $0.05 \mathrm{~mm}[0.002 \mathrm{in}]$ |
| Operating <br> Position | $33.4 \pm 1.2 \mathrm{~mm}[1.315 \pm 0.047 \mathrm{in}]$ |

Terminal Enclosure for IDEM Micro Limit Switches (176000)


Operating Characteristics

Designed to cover and protect all varieties of IDEM Micro Switches

## Operating Characteristics definitions:

- Operating Force: Force required to cause "snap."
- Release Force: Force still applied to plunger or lever when the contacts snap back from the operated position.
- Pre-Travel: Distance from free position to operating position.
- Over-Travel: The extra travel for the plunger or lever to travel safely beyond the operating position.
- MD (Max): Maximum differential (plunger or lever travel from the point where the contacts snap to the point where they snap back).
- FP (max): Extra distance relative to mounting holes that the plunger or lever travels to the snap position, including loose flex.
- Operating Position: Distance relative to mounting holes that the plunger or lever travels to the snap position.


## E IDEM Micro Switches

## Lever Series Limit Switches

- A high-precision, 15A-rated micro switch available in a wide variety of styles
- Lever Series models are available with a choice of actuator types including lever, hinge lever, and roller lever
- Screw terminals for easy connection
- Suitable for a wide range of operating conditions
- Terminal enclosure available

| DEM Lever Serios Micro Switches |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Snap Action Contacts | Pretravel <br> (max) | Over Travel | Force to Operate Contacts |
| 176102-1 | \$10.50 | PDF | Lever | 1 N.O., 1 N.C. | $\begin{gathered} 4 \mathrm{~mm} \\ {[0.157 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 1.6 \mathrm{~mm} \\ {[0.063 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 141 \mathrm{~g} \\ {[0.31 \mathrm{lb}]} \end{gathered}$ |
| 176102-5 | \$49.00 | PDF | Lever (pack of 5) |  |  |  |  |
| 176103-1 | \$12.00 | PDF | Lever with steel roller | 1 N.O., 1 N.C. | $\begin{gathered} 4 \mathrm{~mm} \\ {[0.157 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 1.6 \mathrm{~mm} \\ {[0.063 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 141 \mathrm{~g} \\ {[0.31 \mathrm{lb}]} \end{gathered}$ |
| 176103-5 | \$54.00 | PDF | Lever with steel roller (pack of 5) |  |  |  |  |
| 176109-1 | \$12.00 | PDF | Lever hinge long | 1 N.O., 1 N.C. | $\begin{gathered} 10 \mathrm{~mm} \\ {[0.394 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 5.6 \mathrm{~mm} \\ {[0.220 \mathrm{in}]^{\top}} \end{gathered}$ | $\begin{gathered} 70 \mathrm{~g} \\ {[0.15 \mathrm{lb}]} \end{gathered}$ |
| 176109-5 | \$54.00 | PDF | Lever hinge long (pack of 5) |  |  |  |  |
| 176110-1 | \$12.00 | PDF | Lever hinge | 1 N.O., 1 N.C. | $\begin{gathered} 7 \mathrm{~mm} \\ {[0.276 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 3.5 \mathrm{~mm} \\ 0.138 \mathrm{in}] \end{gathered}$ | $\begin{gathered} 90 \mathrm{~g} \\ {[0.2 \mathrm{lb}]} \end{gathered}$ |
| 176110-5 | \$54.00 | PDF | Lever hinge (pack of 5) |  |  |  |  |
| 176111-1 | \$13.00 | PDF | Lever hinge long with steel roller | 1 N.O., 1 N.C. | $\begin{gathered} 7.1 \mathrm{~mm} \\ {[0.280 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 4 \mathrm{~mm} \\ {[0.157 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 100 \mathrm{~g} \\ {[0.22 \mathrm{lb}]} \end{gathered}$ |
| 176111-5 | \$57.00 | PDF | Lever hinge long with steel roller (pack of 5) |  |  |  |  |
| 176112-1 | \$12.50 | PDF | Lever hinge with steel roller | 1 N.O., 1 N.C. | $\begin{gathered} 2.7 \mathrm{~mm} \\ {[0.106 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 2.4 \mathrm{~mm} \\ {[0.094 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 160 \mathrm{~g} \\ {[0.35 \mathrm{lb}]} \end{gathered}$ |
| 176112-5 | \$56.00 | PDF | Lever hinge with steel roller (pack of 5) |  |  |  |  |
| 176113-1 | \$14.00 | PDF | One-way horizontal hinge lever with steel roller | 1 N.O., 1 N.C. | $\begin{gathered} 2.7 \mathrm{~mm} \\ {[0.106 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 2.4 \mathrm{~mm} \\ {[0.094 \mathrm{in}]} \end{gathered}$ | $\begin{gathered} 170 \mathrm{~g} \\ {[0.37 \mathrm{lb}]} \end{gathered}$ |
| 176113-5 | \$63.00 | PDF | One-way horizontal hinge lever with steel roller (pack of 5) |  |  |  |  |


| $\underline{\mathbf{1 7 6 0 0 0 - 1}}$ | $\$ 1.75$ | $\underline{\text { PDF }}$ | Terminal enclosure for IDEM micro limit switches. Polyvinyl chloride (PVC). |
| :--- | :---: | :---: | :---: |
| $\underline{\mathbf{1 7 6 0 0 0 - 5}}$ | $\$ 8.75$ | $\underline{\text { PDF }}$ | Terminal enclosure for IDEM micro limit switches (pack of 5). Polyvinyl chloride (PVC). |



## IDEM Micro Switches, Lever Series

## Operating Characteristics

Lever (176102)


| Operating Characieristics |  |
| :--- | :---: |
| Operating Force | $141 \mathrm{~g}[0.31 \mathrm{lb}]$ |
| Release Force <br> (min) | $14 \mathrm{~g}[0.03 \mathrm{lb}]$ |
| Pre-Travel (max) | $4 \mathrm{~mm}[0.157 \mathrm{in}]$ |
| Over-Travel <br> (min) | $1.6 \mathrm{~mm}[0.063 \mathrm{in}]$ |
| MD (max) | $1.3 \mathrm{~mm}[0.051 \mathrm{in}]$ |
| FP (max) | $20.8 \mathrm{~mm}[0.819 \mathrm{in}]$ |
| Operating <br> Position | $17.4 \pm 0.8 \mathrm{~mm}[0.685 \pm 0.031 \mathrm{in}]$ |

Lever With Steel Roller (176103)


| Operat'ng Characteristics |  |
| :--- | :---: |
| Operating Force | $141 \mathrm{~g}[0.31 \mathrm{lb}]$ |
| Release Force <br> (min) | $14 \mathrm{~g}[0.03 \mathrm{lb}]$ |
| Pre-Travel (max) | $4 \mathrm{~mm}[0.157 \mathrm{in}]$ |
| Over-Travel <br> (min) | $1.6 \mathrm{~mm}[0.063 \mathrm{in}]$ |
| MD (max) | $1.3 \mathrm{~mm}[0.051 \mathrm{in}]$ |
| FP (max) | $31.8 \mathrm{~mm}[1.252 \mathrm{in}]$ |
| Operating <br> Position | $28.6 \pm 0.8 \mathrm{~mm}[1.126 \pm 0.031 \mathrm{in}]$ |

Lever Hinge Long (176109)


## Operating Characteristics

| Operating Force | $70 \mathrm{~g}[0.15 \mathrm{lb}]$ |
| :--- | :---: |
| Release Force <br> (min) | $14 \mathrm{~g}[0.03 \mathrm{lb}]$ |
| Pre-Travel (max) | $10 \mathrm{~mm}[0.394 \mathrm{in}]$ |
| Over-Travel <br> (min) | $5.6 \mathrm{~mm}[0.220 \mathrm{in}]$ |
| $\boldsymbol{M D}$ (max) | $1.27 \mathrm{~mm}[0.050 \mathrm{in}]$ |
| FP (max) | $28.2 \mathrm{~mm}[1.110 \mathrm{in}]$ |
| Operating <br> Position | $19 \pm 0.8 \mathrm{~mm}[0.748 \pm 0.031 \mathrm{in}]$ |

## Lever Hinge (176110)



| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $90 \mathrm{~g}[0.2 \mathrm{lb}]$ |
| Release Force <br> (min) | $18 \mathrm{~g}[0.04 \mathrm{lb}]$ |
| Pre-Travel (max) | $7 \mathrm{~mm}[0.276 \mathrm{in}]$ |
| Over-Travel <br> (min) | $3.5 \mathrm{~mm} 0.138 \mathrm{in}]$ |
| $\boldsymbol{M D}$ (max) | $1 \mathrm{~mm}[0.039 \mathrm{in}]$ |
| FP (max) | $26.2 \mathrm{~mm}[1.031 \mathrm{in}]$ |
| Operating <br> Position | $19.8 \pm 0.8 \mathrm{~mm}[0.780 \pm 0.032 \mathrm{in}]$ |

Lever Hinge Long With Steel Roller (176111)


| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $100 \mathrm{~g}[0.22 \mathrm{lb}]$ |
| Release Force <br> (min) | $22 \mathrm{~g}[0.05 \mathrm{lb}]$ |
| Pre-Travel (max) | $7.1 \mathrm{~mm}[0.280 \mathrm{in}]$ |
| Over-Travel <br> (min) | $4 \mathrm{~mm}[0.157 \mathrm{in}]$ |
| $\boldsymbol{M D}$ (max) | $1.02 \mathrm{~mm}[0.040 \mathrm{in}]$ |
| FP (max) | $36.5 \mathrm{~mm}[1.437 \mathrm{in}]$ |
| Operating <br> Position | $30.2 \pm 0.4 \mathrm{~mm}[1.189 \pm 0.016 \mathrm{in}]$ |

## Operating Characteristics definitions:

- Operating Force: Force required to cause "snap."
- Release Force: Force still applied to plunger or lever when the contacts snap back from the operated position.
- Pre-Travel: Distance from free position to operating position.
- Over-Travel: The extra travel for the plunger or lever to travel safely beyond the operating position.
- MD (Max): Maximum differential (plunger or lever travel from the point where the contacts snap to the point where they snap back).
- FP (max): Extra distance relative to mounting holes that the plunger or lever travels to the snap position, including loose flex.
- Operating Position: Distance relative to mounting holes that the plunger or lever travels to the snap position.


## IDEM Micro Switches, Lever Series <br> Operating Characteristics (continued)

Lever Hinge With Steel Roller (176112)


| Operating Characteristics |  |
| :--- | :---: |
| Operating Force | $160 \mathrm{~g}[0.35 \mathrm{lb}]$ |
| Release Force <br> (min) | $42 \mathrm{~g}[0.09 \mathrm{lb}]$ |
| Pre-Travel (max) | $2.7 \mathrm{~mm}[0.106 \mathrm{in}]$ |
| Over-Travel <br> (min) | $2.4 \mathrm{~mm}[0.094 \mathrm{in}]$ |
| $\boldsymbol{M D}$ (max) | $0.5 \mathrm{~mm}[0.020 \mathrm{in}]$ |
| FP (max) | $32.5 \mathrm{~mm}[1.280 \mathrm{in}]$ |
| Operating <br> Position | $30.2 \pm 0.4 \mathrm{~mm}[1.189 \pm 0.016 \mathrm{in}]$ |

One-way Horizontal Hinge Lever With Steel Roller (176113)


| Operating Characieristics |  |
| :--- | :---: |
| Operating Force | $170 \mathrm{~g}[0.37 \mathrm{lb}]$ |
| Release Force <br> (min) | $42 \mathrm{~g}[0.09 \mathrm{lb}]$ |
| Pre-Travel (max) | $2.7 \mathrm{~mm}[0.106 \mathrm{in}]$ |
| Over-Travel <br> (min) | $2.4 \mathrm{~mm}[0.094 \mathrm{in}]$ |
| MD (max) | $0.51 \mathrm{~mm}[0.020 \mathrm{in}]$ |
| FP (max) | $43.6 \mathrm{~mm}[1.717 \mathrm{in}]$ |
| Operating <br> Position | $41.3 \pm 0.8 \mathrm{~mm}[1.626 \pm 0.031 \mathrm{in}]$ |

## Terminal Enclosure for IDEM Micro Limit Switches (176000)



## Operating Characteristics

Designed to cover and protect all varieties of IDEM Micro Switches

## Operating Characteristics definitions:

- Operating Force: Force required to cause "snap."
- Release Force: Force still applied to plunger or lever when the contacts snap back from the operated position.
- Pre-Travel: Distance from free position to operating position.
- Over-Travel: The extra travel for the plunger or lever to travel safely beyond the operating position.
- MD (Max): Maximum differential (plunger or lever travel from the point where the contacts snap to the point where they snap back).
- FP (max): Extra distance relative to mounting holes that the plunger or lever travels to the snap position, including loose flex.
- Operating Position: Distance relative to mounting holes that the plunger or lever travels to the snap position.


## IDEM Micro Switches General Specifications

IDEM Micro Switches General Specifications
Environmental

| Degree of Protection | None |
| :--- | :---: |
| Temperature Range | -25 to $80^{\circ} \mathrm{C}\left[-13\right.$ to $\left.176^{\circ} \mathrm{F}\right]$ |
| Mechanical Ratings |  |


| Mechanical Life | 1,000,000 operations minimum |
| :---: | :---: |
| Switch Body | Phenolic (composite resin) |
| Enclosure (Part Number 176000) | Polyvinyl chloride (PVC) |
| Contact Blocks Rating |  |
| Contact Resistance | 15 m Ohms max (initial) |
| Electrical Ratings | $0.5 \mathrm{~A} \mathrm{125VDC}$ 0.25 A 250 VDC 0.125 hp 125 VDC 0.25 hp 250 VDC 20A @ 250VAC EN61058-1 and 15A @ 125VAC or 250VAC UL61058-1 |
|  | Make: 0.25 A at 120VDC; 0.125 A at 240VDC |
| Dielectric Strength | Between terminals of same polarity 100 VAC ( $50 / 60 \mathrm{~Hz}$ for 1 minute) |
| Electrical Life | 100,000 operations at full load |
| Wiring Connections | M $4 \times 5.5$ terminal screw |
| Torque Requirements | Mounting screws: $1.5 \mathrm{~N} \cdot \mathrm{~m}[1.11 \mathrm{lb} \cdot \mathrm{ft}]$ <br> Connector screws: 1.0 to $1.2 \mathrm{~N} \cdot \mathrm{~m}$ [ 0.74 to $0.89 \mathrm{lb} \cdot \mathrm{ft}]$ |
| Agency Approvals * | cULus E482215 (Exception: 176000 not UL listed) CE/Reach compliant |

*To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

## Compact Limit Switches

## AEM2G Series Metal Housing <br> (Halogen-Free Cable)

- Die-cast metal housings
- 1m halogen-free cable
- 1 N.O. and 1 N.C. contact on all units
- Compact size with standard 25 mm hole spacing
- Wide offering of head actuators
- Epoxy resin filled for IP67 rating
- Snap-action (Z11) contacts
- N.C. contacts are positive-opening operated unless otherwise noted.

| A $\mathrm{E}^{\text {a }}$ ( Serics Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed (m/s [ft/sec]) | $\begin{aligned} & \text { Min. Actuation } \\ & \text { Force }(N) \\ & \text { or Torque }(N \cdot m) \end{aligned}$ | Min. Positive Opening Force ( N ) or Torque $(N \cdot m)$ | Connection Type |
| AEM2G12Z11-HF1 | \$26.00 | PDF | Metal plunger with metal roller | 0.1 [0.33] | 10N [2.25 lbf] | 30 N [6.74 lbf] | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable, bottom exit |
| AEM2G16Z11-HF1 | \$26.00 | PDF | Metal plunger with dust cap | 0.5 [1.64] | 15 N [3.37 lbf] | 30 N [6.74 lbf] | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable, bottom exit |
| AEM2G42Z11-HF1 | \$26.00 | PDF | Side rotary lever with 14 mm metal roller | 1.5 [4.92] | $0.08 \mathrm{~N} \cdot \mathrm{~m}[0.06 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}[0.21 \mathrm{lb} \cdot \mathrm{ft}]$ | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable, bottom exit |
| AEM2G51Z11-HF1 | \$26.00 | PDF | Side rotary adjustable lever with 18 mm nylon roller | 1.5 [4.92] | $0.08 \mathrm{~N} \cdot \mathrm{~m}[0.06 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}[0.21 \mathrm{lb} \cdot \mathrm{ft}]$ | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable, bottom exit |
| AEM2G71Z11-HF1 | \$26.00 | PDF | Side rotary adjustable 3 mm stainless steel rod | 1.5 [4.92] | $0.08 \mathrm{~N} \cdot \mathrm{~m}[0.06 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}[0.21 \mathrm{lb} \cdot \mathrm{ft}]$ | 3.28 ft [1m] cable, bottom exit |
| AEM2G93Z11-HF1* | \$26.00 | PDF | 360 degree stainless steel spring | 0.1 [0.33] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | - | 3.28 ft [1m] cable, bottom exit |

* This unit is not a positive opening unit.


## Contact Configuration

## Z11 Snap-action contacts

1 N.O. and 1 N.C.


NOTE: Units are positive opening unless indicated otherwise in selection chart



AEM2G93Z11-HF1

## Compact Limit Switches Specifications

| Compact Limit Switches Specifications |  |
| :---: | :---: |
| Series | AEM-HF1 |
| Environmental |  |
| Degree of Protection | IP67 according to IEC 60529 |
| Temperature Range | Storage: -40 to $70^{\circ} \mathrm{C}\left[-40\right.$ to $\left.158^{\circ} \mathrm{F}\right]$. Operating: -25 to $70^{\circ} \mathrm{C}\left[-13\right.$ to $\left.158^{\circ} \mathrm{F}\right]$ |
| Mechanical Ratings |  |
| Mechanical Life | 10 million operations: Models G12, G42, G51, G71 5 million operations: G16, G93. |
| Enclosure Material | ZAMAK (zinc alloy) |
| Contact Blocks Rating |  |
| Positive Opening | Yes, except G93 |
| Electrical Ratings | Make: 100A @ 24VAC; 60A @ 120VAC; 30A @ 240VAC Break: 10A @ 24VAC; 6A @ 120VAC; 3A @ 24OVAC |
|  | 2.8A @ 24VDC; 0.55A @ 125VDC; 0.27A@250VDC |
| Maximum Switching Frequency | Contact blocks: all one cycle per second |
| Repeat Accuracy | 0.05 mm on the operating points at 1 million operations |
| Short-Circuit Protection | 10A @ <500V |
| Contact Resistance | $25 \mathrm{~m} \Omega$ |
| Head Rotation | 180 Degree Only |
| Rated Insulation Voltage | B300, R300 according to UL508 <br> 400 V (degree of pollution: 3) according to IEC 60947-1 |
| Connection Type | Cable: $1 \mathrm{~m}\left[3.28 \mathrm{ft}\right.$ Halogen Free cable, $5 \times 0.75 \mathrm{~mm}^{2}$ ( 18 AWG ). Overall cable diameter: 8 mm [ 0.31 in ] |
| Wiring Terminal Markings | N.C. black/brown, N.O. blue/brown |
| Electrical Protection | Class I according to IEC60536-1 |
| 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 |
| Torque | N/A |
| Agency Approvals * | UL file E191072, CE |

*To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

## Achie $\$ e"' Compact Limit Switches

## AEP Series Plastic Housing (Plunger Actuator)

- Double insulated plastic housing
- 3.28 ft [1m] cable/5-pin M12 quick-disconnect (right exit)
- Compact size with standard 25 mm [0.98 in] hole spacing
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22) contacts are available
- N.C. contacts are positive-opening operated unless otherwise noted.

| AEP Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed | Min. Actuation Force | Min. Positive Opening Force | Number of Contacts | Connection Type |
| AEP2G11Z11-1 | \$16.00 | PDF | Metal plunger | 0.5 ms | $\begin{gathered} 15 \mathrm{~N} \\ {[3.37 \mathrm{lbf}]} \end{gathered}$ | $\begin{gathered} 30 \mathrm{~N} \\ {[6.74 \mathrm{lbf}]} \end{gathered}$ | 1 N.O./1 N.C. | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G11Z11MR | \$19.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G11Z22-1 | \$22.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G12Z11-1 | \$18.00 | PDF | Metal plunger with metal roller | 0.1 ms | $\begin{array}{r} 10 \mathrm{~N} \\ {[2.25 \mathrm{lbf}]} \\ \hline \end{array}$ | $\begin{gathered} 30 \mathrm{~N} \\ {[6.74 \mathrm{lbf}]} \\ \hline \end{gathered}$ | 1 N.O./1 N.C. | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G12Z11MR | \$22.00 | PDF |  | 0.1 ms | 10N | $\begin{gathered} 30 \mathrm{~N} \\ {[6.74 \mathrm{lbf}]} \end{gathered}$ |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G12Z22-1 | \$25.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G16Z11-1 | \$18.00 | PDF | Metal plunger with dust cap | 0.5 ms | $\begin{gathered} 15 \mathrm{~N} \\ {[3.37 \mathrm{lbf}]} \end{gathered}$ | $\begin{gathered} 30 \mathrm{~N} \\ {[6.74 \mathrm{lbf}]} \end{gathered}$ | 1 N.O./1 N.C. | 3.28 ft [1m] cable (bottom exit) |
| AEP2G16Z11MR | \$22.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G16Z22-1 | \$24.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | 3.28 ft [ 1 m ] cable (bottom exit) |
| AEP2G21Z22-1 | \$24.00 | PDF | Metal plunger fixing nuts |  |  |  |  | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G22Z22-1 | \$26.00 | PDF | Metal plunger with metal roller and fixing nuts |  | $\begin{gathered} 10 \mathrm{~N} \\ {[2.25 \mathrm{lbf}]} \end{gathered}$ |  |  | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |



AEP2G11Z11-1


AEP2G12Z11-1


AEP2G16Z11-1


5-pin M12 quick- disconnect (right exit)

## Achie $V{ }^{\prime \prime}$ Compact Limit Switches



AEP2G11Z22-1


AEP2G21Z22-1


AEP2G12Z22-1


AEP2G16Z22-1


AEP2G22Z22-1

Connector


Contact Configuration


Note: Pin 5 is not connected

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


Z22 Snap-action contacts 2 N.O. and 2 N.C.


## Achie ${ }^{\text {VI }}$ Compact Limit Switches

## AEP Series (Side Rotary Lever Actuator)

- Double insulated plastic housings
- $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable/5-pin M12 quick-disconnect (right exit)
- Compact size with standard 25 mm [ 0.98 in ] hole spacing
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22) contacts are available
- N.C. contacts are positive-opening operated unless otherwise noted.

| AEP Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed | $\begin{aligned} & \text { Min. } \\ & \text { Actuation } \\ & \text { Force } \end{aligned}$ | Min. Positive Opening Force | Number of Contacts | Connection Type |
| AEP2G41Z11-1 | \$17.00 | PDF | Side rotary lever with 14 mm nylon roller | 1.5 ms | $0.08 \mathrm{~N} \cdot \mathrm{~m}$ | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ | 1 N.O./1 N.C. | 3.28 ft [1m] cable (bottom exit) |
| AEP2G41Z11MR | \$21.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G41Z22-1 | \$23.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G42Z11-1 | \$17.00 | PDF | Side rotary lever with 14 mm metal roller | 1.5 ms | 0.08 N•m | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ | 1 N.O./1 N.C | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G42Z11MR | \$21.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G43Z11-1 | \$18.00 | PDF | Side rotary lever with 14 mm ball bearing roller | 1.5 ms | 0.08 N•m | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ |  | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G43Z11MR | \$22.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G51Z11-1 | \$18.00 | PDF | Side rotary adjustable lever with 18 mm nylon roller | 1.5 ms | 0.08 N•m | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ |  | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G51Z11MR | \$21.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G51Z22-1 | \$24.00 | PDF |  |  |  |  | 2 N.O./2 N.C. | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G71Z11-1 | \$18.00 | PDF | Side rotary adjustable 3 mm stainless steel rod | 1.5 ms | 0.08 N•m | $0.28 \mathrm{~N} \cdot \mathrm{~m}$ | 1 N.O./1 N.C | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G71Z11MR | \$22.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |



AEP2G41Z22-1


AEP2G42Z11-1


AEP2G43Z11-1


AEP2G51Z22-1


AEP2G71Z11-1

## Achie $\because$ "" Compact Limit Switches

Connector


Note: Pin 5 is not connected

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


AEP2G41Z22-1 and AEP2G51Z22-1


Z22 Snap-action contacts
2 N.O. and 2 N.C.


## Achie Ve" Compact Limit Switches

## AEP Series Plastic Housing (Stainless Steel Spring Actuator)

- Double-insulated plastic housing
- $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable/5-pin M12 quick-disconnect (right exit)
- Compact size with standard 25 mm [0.98] in hole spacing
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22) contacts are available

| AEP Series Compact Limit Switches Selection Chart |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed | $\begin{aligned} & \text { Min. } \\ & \text { Actuation } \\ & \text { Force } \end{aligned}$ | Min. Positive Opening Force | Number of Contacts | Connection Type |
| AEP2G92Z11-1 | \$18.00 | PDF | 360 degree stainless steel spring with nylon tip | 0.1 ms | $0.10 \mathrm{~N} \cdot \mathrm{~m}$ | - | 1 N.O. 11 N.C | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G92Z11MR | \$22.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G93Z11-1 | \$18.00 | PDF | 360 degree stainless steel spring |  |  |  |  | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |
| AEP2G93Z11MR | \$22.00 | PDF |  |  |  |  |  | 5-pin M12 quick-disconnect (right exit) |
| AEP2G93Z22-1 | \$26.00 | PDF |  |  |  |  | 2 N.O./2 N.C | $3.28 \mathrm{ft}[1 \mathrm{~m}]$ cable (bottom exit) |



AEP2G92Z11-1


AEP2G93Z22-1

Housing style


5-pin M12 quick-disconnect (right exit)

## Compact Limit Switches

AEP Series Plastic Housing (Stainless Steel Spring Actuator)

Connector


Contact Configuration


Note: Pin 5 is not connected

Z22 Snap-action contacts 2 N.O. and 2 N.C.


Achie Ve" Compact Limit Switch Specifications

*To obtain the most current agency approval information, see the Agency Compliance \& Certifications Checklist section on the specific part number's web page.

## IEC Limit Switches

## AAM Series Metal Housing (Plunger Actuator)

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

| A AM Series Limit Switches Whth Metal Enclosure Selection Ghart |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed (m/s [ft/sec]) | Min. Actuation Force (N) or Torque $(N \cdot m)$ | Min. Positive Opening Force (N) or Torque ( $N \cdot m$ ) | Connection Type |
| AAM2F11Z11 | \$13.00 | PDF | Metal plunger | 0.5 [1.64] | 15N [3.37 lbf] | 30 N [6.74 lbf] | 1/2-in NPT <br> cable entry |
| AAM7F11Z11 | Retired | PDF | Metal plunger | 0.5 [1.64] | 15N [3.37 lbf] | 30 N [6.74 lbf] | 5-pin M12 quick-disconnect (bottom) |
| AAM2F12Z11 | \$14.00 | PDF | Metal plunger with metal roller | 0.3 [0.98] | 12 N [2.70 lbf] | 30 N [6.74 lbf] | 1/2-in NPT <br> cable entry |
| AAM7F12Z11 | \$21.00 | PDF | Metal plunger with metal roller | 0.3 [0.98] | 12N [2.70 lbf] | 30 N [6.74 lbf] | 5-pin M12 quick-disconnect (bottom) |
| AAM2T14Z11 | \$14.00 | PDF | Metal plunger with dust cap | 0.5 [1.64] | 15N [3.37 lbf] | 30 N [6.74 lbf] | 1/2-in NPT cable entry |
| AAM7T14Z11 | Retired | PDF | Metal plunger with dust cap | 0.5 [1.64] | 15N [3.37 lbf] | 30 N [6.74 lbf] | 5-pin M12 quick-disconnect (bottom) |
| AAM2T35Z11 | \$15.00 | PDF | One-way horizontal lever with nylon roller | 1 [3.28] | 7N [1.57 lbf] | 24 N [5.40 lbf] | 1/2-in NPT cable entry |
| AAM7T35Z11 | \$21.00 | PDF | One-way horizontal lever with nylon roller | $13.28]$ | 7N [1.57 lbf] | 24 N [5.40 lbf] | 5-pin M12 quick-disconnect (bottom) |



Housing style


AAM2F12Z11


1/2-in NPT cable entry


AAM Series Metal Housing (Plunger Actuator)


## AAM Series Metal Housing (Side Rotary Lever Actuator)

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

| A M S Series Limit Switohes Whtn Metal Enclosure Selection Chart |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed (m/s [ft/sec]) | Min. Actuation Force (N) or Torque $(N \cdot m)$ | Min. Positive Opening Force ( $N$ ) or Torque ( $N \cdot m$ ) | Connection Type |
| AAM2F43Z11 | \$15.00 | PDF | Side rotary lever with 18 mm metal roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 1/2-in NPT cable entry |
| AAM7F43Z11 | \$21.00 | PDF | Side rotary lever with 18 mm metal roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAM2F46Z11 | \$15.00 | PDF | Side rotary lever inward with 18 mm metal roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 1/2-in NPT cable entry |
| AAM7F46Z11 | \$22.00 | PDF | Side rotary lever inward with 18 mm metal roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAM2F53Z11 | \$15.00 | PDF | Side rotary adjustable metal lever with 18 mm metal roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 1/2-in NPT cable entry |
| AAM7F53Z11 | \$22.00 | PDF | Side rotary adjustable metal lever with 18mm metal roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAM2F71Z11 | \$15.00 | PDF | Side rotary adjustable 3 mm stainless steel rod | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 1/2-in NPT cable entry |
| AAM7F71Z11 | \$22.00 | PDF | Side rotary adjustable 3 mm stainless steel rod | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{ft}]$ | 5-pin M12 quick-disconnect (bottom) |



AAM2F43Z11


AAM2F46Z11

Housing style



## IEC Limit Switches

AAM Series Metal Housing (Side Rotary Lever Actuator)

Connector


## Contact Configuration



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


## 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 ( $\mathrm{m} / \mathrm{s}[\mathrm{ft} / \mathrm{sec}]$ ) | Min. Actuation Force (N) or Torque $(N \cdot m)$ | Min. Positive Opening Force ( $N$ ) or Torque ( $N \cdot m$ ) | Connection Type |
| AAM2T93Z11 | \$15.00 | PDF | 360 degree stainless steel spring | 1 [3.28] | $0.12 \mathrm{~N} \cdot \mathrm{~m}[0.09 \mathrm{lb} \cdot \mathrm{ft}]$ | - | 1/2-in NPT cable entry |
| AAM7T93Z11 | \$22.00 | PDF | 360 degree stainless steel spring | 1 [3.28] | $0.12 \mathrm{~N} \cdot \mathrm{~m}[0.09 \mathrm{lb} \cdot \mathrm{ft}]$ | - | 5-pin M12 quickdisconnect (bottom) |

## Housing style



AAM Series Metal Housing (Stainless Steel Spring Actuator)

## Connector



## Contact Configuration



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


## IEC Limit Switches

## AAP Series Plastic Housing (Plunger Actuator)

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

| AAP Series Compact Limit Switches Whth Plastic Enclosure With Connector Selection Chart |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed ( $\mathrm{m} / \mathrm{s}$ [ft/sec]) | $\begin{aligned} & \text { Min. Actuation } \\ & \text { Force ( } N \text { ) } \\ & \text { or Torque ( } N \cdot m \text { ) } \end{aligned}$ | Min. Positive Opening Force (N) or Torque ( $N \cdot m$ ) | Connection Type |
| AAP2T10Z11 | \$9.50 | PDF | Plastic plunger | 0.5 [1.64] | 15N [3.37 lbf] | 30N [6.74 lbf] | PG11 threads with 1/2-inch NPT adapter |
| AAP7T10Z11 | Retired | PDF | Plastic plunger | 0.5 [1.64] | 15N [3.37 lbf] | 30N [6.74 lbf] | 5-pin M12 quickdisconnect (bottom) |
| AAP2T13Z11 | \$13.50 | PDF | Galvanized steel plunger with polyamide plastic roller | 0.3 [0.98] | 12 N [2.70 lbf] | 30N [6.74 lbf] | PG11 threads with 1/2-inch NPT adapter |
| AAP7T13Z11 | \$15.00 | PDF | Galvanized steel plunger with polyamide plastic roller | 0.3 [0.98] | 12 N [2.70 lbf] | 30N [6.74 lbf] | 5-pin M12 quickdisconnect (bottom) |
| AAP2T14Z11 | \$13.50 | 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 |
| AAP7T14Z11 | Retired | PDF | Metal plunger with dust cap | 0.5 [1.64] | 15N [3.37 lbf] | 30N [6.74 lbf] | 5-pin M12 quickdisconnect (bottom) |
| AAP2T35Z11 | \$13.50 | PDF | One-way horizontal lever with polyamide roller | 1.0 [3.28] | 7N [1.57 lbf] | 24 N [5.40 lbf] | PG11 threads with 1/2-inch NPT adapter |
| AAP7T35Z11 | \$17.00 | PDF | One-way horizontal lever with polyamide roller | 1.0 [3.28] | 7 N [1.57 lbf] | 24N [5.40 lbf] | 5-pin M12 quickdisconnect (bottom) |

[^3]Connector


## Contact Configuration



## Z11 Snap-action contacts

 1 N.O. and 1 N.C.

## AAP Series Plastic Housing (Side Rotary Lever Actuator)

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

| AAP Series Compact Limit Switches With Plastic Enclosure With Connector Selection Chart |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price | Drawing Link | Actuator Type | Max. Actuation Speed (m/s [ft/sec]) | Min. Actuation Force (N) or Torque ( $N \cdot m$ ) | Min. Positive Opening Force ( $N$ ) or Torque ( $N \cdot m$ ) | Connection Type |
| AAP2T41Z11 | \$13.50 | PDF | Side rotary lever with polyamide roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \circ \mathrm{tt}]$ | PG11 threads with a 1/2-inch NPT adapter |
| AAP7T41Z11 | \$16.00 | PDF | Side rotary lever with polyamide roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAP2T42Z11 | \$13.00 | PDF | Side rotary lever with 50 mm rubber roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | PG11 threads with a 1/2-inch NPT adapter |
| AAP7T42Z11 | Retired | PDF | Side rotary lever with 50 mm rubber roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAP2T45Z11 | \$13.00 | PDF | Side rotary lever inward with 18 mm nylon roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | PG11 threads with a 1/2-inch NPT adapter |
| AAP7T45Z11 | Retired | PDF | Side rotary lever inward with 18mm nylon roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAP2T51Z11 | \$13.50 | PDF | Side rotary adjustable metal lever with polyamide roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | PG11 threads with a 1/2-inch NPT adapter |
| AAP7T51Z11 | \$17.00 | PDF | Side rotary adjustable metal lever with polyamide roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAP2T5100Z11 | \$13.00 | PDF | Side rotary 2 mm step adjustable lever with 18 mm nylon roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | PG11 threads with a 1/2-inch NPT adapter |
| AAP7T5100Z11 | \$17.00 | PDF | Side rotary 2 mm step adjustable lever with 18 mm nylon roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAP2T5200Z11 | \$14.00 | PDF | Side rotary adjustable lever with 50 mm rubber roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | PG11 threads with a 1/2-inch NPT adapter |
| AAP7T5200Z11 | \$18.00 | PDF | Side rotary adjustable lever with 50 mm rubber roller | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | 5-pin M12 quick-disconnect (bottom) |
| AAP2T71Z11 | \$13.50 | PDF | Side rotary adjustable 3 mm stainless steel rod | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \circ \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | PG11 threads with a 1/2-inch NPT adapter |
| AAP7T71Z11 | \$17.00 | PDF | Side rotary adjustable 3 mm stainless steel rod | 1.5 [4.92] | $0.10 \mathrm{~N} \cdot \mathrm{~m}[0.07 \mathrm{lb} \cdot \mathrm{ft}]$ | $0.32 \mathrm{~N} \cdot \mathrm{~m}[0.24 \mathrm{lb} \cdot \mathrm{tt}]$ | 5-pin M12 quick-disconnect (bottom) |

## IEC Limit Switches

AAP Series Plastic Housing (Side Rotary Lever Actuator)


Housing style

G11 threads with 1/2-inch NPT adapter


5-pin M12 quick-disconnect (bottom)

Connector


Contact Configuration


## Z11 Snap-action contacts

 1 N.O. and 1 N.C.

## IEC Limit Switches

## AAP Series Plastic Housing (Stainless Steel Spring Actuator)

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

| AAP Series Compact Limit Switches WFth Plastic Enclosure With Connector Selection Chart |  |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Part Number | Price |  | Actuator Type | Max. Actuation <br> Speed <br> $(m / s[f t / s e c])$ | Min. Actuation <br> Force $(N)$ <br> or Torque $(N \cdot m)$ | Min. Positive Opening <br> Force $(N)$ <br> or Torque $(N \cdot m)$ | Connection Type |
| $\underline{\text { AAP2T93Z11 }}$ | $\$ 13.00$ |  | 360 degree stainless steel <br> spring | $1[3.28]$ | $0.12 \mathrm{~N} \cdot \mathrm{~m}[0.09 \mathrm{lb} \cdot f \mathrm{ft}]$ | - | PG11 threads with a <br> $1 / 2$-inch NPT adapter |
| $\underline{\text { AAP7T93Z11 }}$ | $\$ 17.00$ |  | 360 degree stainless steel <br> spring | $1[3.28]$ | $0.12 \mathrm{~N} \cdot \mathrm{~m}[0.09 \mathrm{lb} \cdot \mathrm{ft}]$ | - | 5-pin M12 quick-disconnect <br> (bottom) |



Housing style


## IEC Limit Switches

AAP Series Plastic Housing (Stainless Steel Spring Actuator)

Connector


## Contact Configuration



## Z11 Snap-action contacts

 1 N.O. and 1 N.C.

## IEC Limit Switches Specifications



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 1 ms to 3 ms 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



## 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.


AC-15 Slow Action


## 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)

| DC-13 | Snap Action | Slow Action |
| :--- | :---: | :---: |
|  | Power breaking for a durability <br> of 5 million cycles |  |
| $\mathbf{2 4 V}$ | 9.5 W | 12 W |
| $\mathbf{4 8 V}$ | 6.8 W | 9 W |
| $\mathbf{1 1 0 V}$ | 3.6 W | 6 W |


| European |  |
| :---: | :---: |
| Terminal No. |  |
| $11-12$ | Type |
| $13-14$ | N.C. contact of pole no. $1^{1}$ |
| $21-22$ | N.C. contact of pole no. $2^{1}$ |
| $23-24$ | N.O. contact of pole no. $2^{2}$ |

${ }^{1}$ With non-isolated contacts ${ }^{2}$ With isolated contacts
Note: Green/yellow wire is physical earth ground.


## Bar Chart Examples

## (cam angle is 30 degrees)

Diagram in millimeters/cam travel



Diagram in degrees/lever rotation


Diagram in millimeters/plunger trav $\epsilon$


## 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 - $90^{\circ}$ each way


Adjustable lever from 0-360
( $6^{\circ}$ each increment)


## Contact Displacement Values

## Z11 Snap Action Contacts


$A=$ 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
$\mathrm{D}=$ Differential travel (between actuation and release)
$\mathrm{P}=$ 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 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEM2G51Z11-HF1 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEM2G71Z11-HF1 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEM2G93Z11-HF1 | - | $10^{\circ}$ | $20^{\circ}$ | - |
| 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 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAMxF46Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAMxF53Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAMxF71Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAMxT93Z11x | - | $12^{\circ}$ | $23^{\circ}$ | - |

## 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 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAPxT42Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAPxT45Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAPxT51Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAPxT5100Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAPxT5200Z11x | $74^{\circ}$ | $31^{\circ}$ | $47^{\circ}$ |  |
| AAPxT71Z11x | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| AAPxT93Z11x | - | $12^{\circ}$ | $23^{\circ}$ | - |

Contact Displacement Values tables continued on next page

## Achie $\ \mathbf{e}^{\text {m }}$ 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)
$\mathrm{P}=$ 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 | $78^{\circ}$ | $33^{\circ}$ | $20^{\circ}$ | $49^{\circ}$ |
| ABMxE52Z11 | $78^{\circ}$ | $33^{\circ}$ | $20^{\circ}$ | $49^{\circ}$ |
| ABMxE71Z11 | $78^{\circ}$ | $33^{\circ}$ | $20^{\circ}$ | $49^{\circ}$ |
| ABMxE92Z11 | - | $21^{\circ}$ | $9^{\circ}$ | - |
| ABMxE93Z11 | - | $21^{\circ}$ | $21^{\circ}$ | - |
| 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 | $90^{\circ}$ | $31^{\circ}$ | $19^{\circ}$ | $47^{\circ}$ |
| ABPxH51Z11 | $90^{\circ}$ | $31^{\circ}$ | $19^{\circ}$ | $47^{\circ}$ |
| ABPxH71Z11 | $90^{\circ}$ | $31^{\circ}$ | $19^{\circ}$ | $47^{\circ}$ |
| ABPxH92Z11 | - | $27^{\circ}$ | $15^{\circ}$ | - |
| ABPxH93Z11 | - | $27^{\circ}$ | $15^{\circ}$ | - |

## JO2 Snap-action <br> Contacts

2 N.C.



| Contact Displacement Values |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Part Number | Displacement Values (mm [in] or degrees) |  |  |  |
|  | $\boldsymbol{A}$ | $\boldsymbol{B}$ | $\boldsymbol{C}$ | $\boldsymbol{P}$ |
| 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 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADP2T45Z11 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADP2T51Z11 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADP2T5100Z11 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADP2T71Z11 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| 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 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADM2F46Z11 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADM2F53Z11 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADM2F71Z11 | $74^{\circ}$ | $31^{\circ}$ | $17^{\circ}$ | $47^{\circ}$ |
| ADM2T93Z11 | $23^{\circ}$ | $23^{\circ}$ | $12^{\circ}$ | - |
| ADM2T9805Z11A | $5.6[0.22]$ | $2.0[0.07]$ | $0.9[0.03]$ | - |


| Contact Displaccment Values |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Part Number | Displacement Values (mm [in] or degrees) |  |  |  |
|  | $\boldsymbol{A}$ | $\boldsymbol{B}$ | $\boldsymbol{C}$ | $\boldsymbol{P}$ |
| 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 | - | $30^{\circ}$ |  | $46^{\circ}$ |
| AHP2T5100J02-024 | - | $30^{\circ}$ |  | $46^{\circ}$ |
| AHP2T5200J02-024 | - | $30^{\circ}$ |  | $46^{\circ}$ |

## 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
$\mathrm{D}=$ Differential travel (between actuation and release)
$\mathrm{P}=$ 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 | 211 | 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 | 211 | 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 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEP2G41 | Z22 | $75^{\circ}$ | $30^{\circ}$ | $10^{\circ}$ | $55^{\circ}$ |
| AEP2G42 | Z11 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEP2G43 | Z11 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEP2G51 | 211 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEP2G51 | Z22 | $75^{\circ}$ | $30^{\circ}$ | $10^{\circ}$ | $55^{\circ}$ |
| AEP2G71 | 211 | $74^{\circ}$ | $32^{\circ}$ | $21^{\circ}$ | $65^{\circ}$ |
| AEP2G92 | Z11 | - | $20^{\circ}$ | $10^{\circ}$ | - |
| AEP2G93 | 211 | - | $20^{\circ}$ | $10^{\circ}$ | - |
| AEP2G93 | Z22 | - | $19^{\circ}$ | $5^{\circ}$ | - |


[^0]:    *To obtain the most current agency approval information, see the Agency Compliance \& Certifications Checklist section on the specific part number's web page.

[^1]:    *30 seconds between actuations at a max of 119 operations per hour.
    **To obtain the most current agency approval information, see the Agency Compliance \& Certifications Checklist section on the specific part number's web page.

[^2]:    * $\emptyset$ = diameter, SR = surface radius

[^3]:    

    AAP7T14Z11
    

    AAP7T10Z11

    AAP7T13Z11

    AAP7T35Z11
    
    

    5-pin M12 quick- disconnect (bottom)

