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.

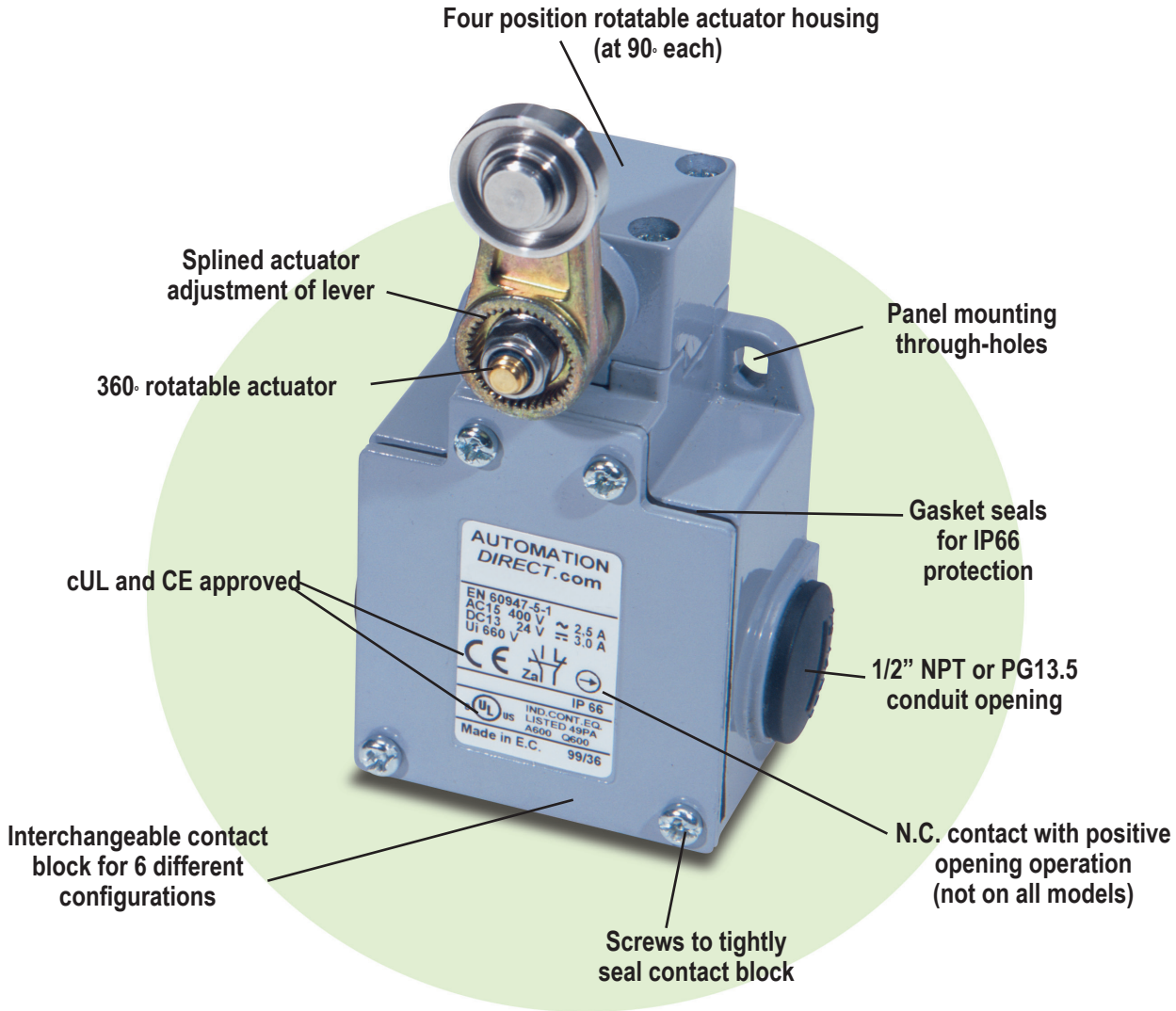
How long does a limit switch last?

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 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	2x2.5 mm^2 (AWG14) to 2x0.5 mm^2 (AWG 18)	2x2.5 mm^2 (AWG14) to 2x0.5 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 Frequency	Contact blocks: all two cycles per second	Contact blocks: all one cycle per second	N/A
Mechanical Service Life	25 million cycles	5 million or 10 million cycles, depending on model	1 million to 10 million cycles, depending on model
Contact Configuration	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. One slow-action set of N.O. / N.C. contacts.	One set of N.O. or N.C. contacts.
Conduit Opening	One cable hole, PG 11 or 1/2 NPT	N/A	N/A
Connection	2x2.5 mm^2 (AWG14) to 2x0.5 mm^2 (AWG 18)	3 meter cable Center or Right Exit; M12 Quick-disconnect 5-Pin Center or Right Exit	2 meter cable, 3 meter cable, or 0.5 m core wire, depending on model.
Agency Approvals	CE markings for applicable CE Directives UL certified (UL508), File E191072. RoHS	CE markings for applicable CE Directives (UL certified (UL508), File E191072. RoHS	N/A

Eaton NEMA Limit Switches

NEMA Limit Switches F25 Series

- 9 side rotary heads available
- 990-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

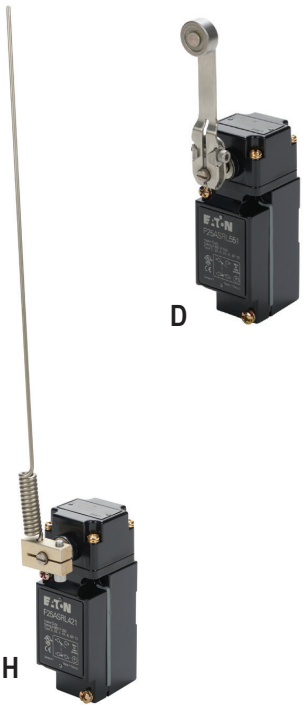
NEMA Limit Switches F25 Series

Part Number	Price	Drawing Link	Actuator Type	Snap Action Contacts	Travel to Operate Contacts	Total Travel	Force to Operate Contacts	Photo
Side Rotary								
F25ASRL200	$;01hfx:	PDF	1.5 inch stainless steel lever with Nylatron roller	(1) N.O./(1) N.C.	5°	90°	3 lb•in [0.34 N•m]	A
F25BSRL200	$01hg8:	PDF		(2) N.O./(2) N.C.				
F25ASRL355	$;01hfy:	PDF	1.5 inch stainless steel lever with metal roller	(1) N.O./(1) N.C.				B
F25BSRL355	$01hg9:	PDF		(2) N.O./(2) N.C.				
F25ASRL549	$;01hfz:	PDF	2 inch stainless steel lever with metal roller	(1) N.O./(1) N.C.				C
F25BSRL549	$01hga:	PDF		(2) N.O./(2) N.C.				
F25ASRL551	$;;01hf]:	PDF	3 inch stainless steel lever with metal roller	(1) N.O./(1) N.C.				D
F25BSRL551	$01hgb:	PDF		(2) N.O./(2) N.C.				
F25ASRL548	$;;01hf[:	PDF	3 inch stainless steel lever with Nylatron roller	(1) N.O./(1) N.C.				E
F25BSRL548	$01hgc:	PDF		(2) N.O./(2) N.C.				
F25ASRL539	$;01hf_:	PDF	Adjustable stainless steel lever with ball bearing roller	(1) N.O./(1) N.C.				F
F25BSRL539	$01hgd:	PDF		(2) N.O./(2) N.C.				
F25ASRL201	$;01hf#:	PDF	Side rotary adjustable stainless steel lever with Nylatron roller	(1) N.O./(1) N.C.				G
F25BSRL201	$01hge:	PDF		(2) N.O./(2) N.C.				
F25ASRL421	$;;01hf!:	PDF	Adjustable spring stainless steel rod	(1) N.O./(1) N.C.				H
F25BSRL421	$;01hgf:	PDF		(2) N.O./(2) N.C.				
F25ASRL142	$;01hf?:	PDF	6 inch Nylatron loop	(1) N.O./(1) N.C.				I
F25BSRL142	$01hgg:	PDF		(2) N.O./(2) N.C.				


A


B


C


H

D


E


F


G


I

Eaton NEMA Limit Switches

NEMA Limit Switches F25 Series

- 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


A


B


C

NEMA Limit Switches F25 Series

Part Number	Price	Drawing Link	Actuator Type	Snap Action Contacts	Travel to Operate Contacts	Total Travel	Force to Operate Contacts	Photo
Side Push								
F25ASP1	$;;01hf,:	PDF	Side metal plunger	(1) N.O./(1) N.C.	0.065 in [1.651 mm]	0.290 in [7.366 mm]	4lb [1.81 kg]	A
F25BSP1	$01hgh:	PDF		(2) N.O./(2) N.C.				
F25ASP2	$01hg0:	PDF	Side metal plunger adjustable	(1) N.O./(1) N.C.				B
F25BSP2	$-01hgi:	PDF		(2) N.O./(2) N.C.				
F25ASP3	$01hg1:	PDF	Side metal plunger with metal roller	(1) N.O./(1) N.C.				C
F25BSP3	$-01hgj:	PDF		(2) N.O./(2) N.C.				
Top Push								
F25ATP1	$01hg2:	PDF	Metal plunger	(1) N.O./(1) N.C.	0.040 in [1.00 mm]	0.280 in [7.366 mm]	4lb [1.81 kg]	D
F25BTP1	$01hgk:	PDF		(2) N.O./(2) N.C.				
F25ATP2	$01hg3:	PDF	Metal plunger adjustable	(1) N.O./(1) N.C.				E
F25BTP2	$-01hgl:	PDF		(2) N.O./(2) N.C.				
F25ATP3	$01hg4:	PDF	Metal plunger with metal roller	(1) N.O./(1) N.C.				F
F25BTP3	$01hgn:	PDF		(2) N.O./(2) N.C.				
Wobble Head								
F25AW2	$01hg5:	PDF	360 degree nylon rod	(1) N.O./(1) N.C.	10°	15°	2 lb•in [1.23 N•m]	G
F25BW2	$01hgo:	PDF		(2) N.O./(2) N.C.				
F25AW3	$01hg6:	PDF	360 degree stainless steel rod	(1) N.O./(1) N.C.				H
F25BW3	$01hgp:	PDF		(2) N.O./(2) N.C.				
F25AW4	$01hg7:	PDF	360 degree stainless steel spring	(1) N.O./(1) N.C.				I
F25BW4	$01hgq:	PDF		(2) N.O./(2) N.C..				


D


F


E


G


I


H

Eaton NEMA Limit Switches Specifications

NEMA Limit Switches Specifications F25 Series		
Environmental		
Degree of Protection		NEMA 3, 3S, 4, 4X, 6, 6P, 13 IP67
Temperature Range		Side Rotary 10°F [-12°C] to 200°F [94°C] Side Push 14°F [-10°C] to 200°F [94°C] Wobble 14°F [-10°C] to 250°F [121°C]
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***	Make: 60A at 120VAC; 30A at 240VAC;15A at 480VAC; 12A at 600VAC Break: 6A at 120VAC; 3A at 240VAC;1.5 A at 480VAC; 1.2 A at 600VAC Continuous: 10A at 480VAC
	DC	Make: 0.25 A at 120VDC; 0.125 A at 240VDC
Maximum Switching Frequency		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 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

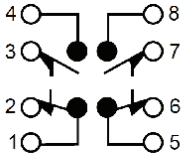
Connection diagram - SPDT, DPDT

The following connection diagram appears on the switch body nameplate.

1 N.O. - 1 N.C.

Must be same polarity

2 N.O. - 2 N.C.



Same polarity each pole

Grounding: Each wiring receptacle contains a green screw terminal proving a GRD connection point for the metal enclosure.

SCHMERSAL IEC Limit Switches

Metal Body Limit Switches 235 Series

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" NPT conduit adapter
- Contact patterns similar to those of leading competitors

Metal Body Limit Switches 235 Series

Part Number	Price	Actuator Type	Snap Action Contacts	Travel to Operate Contacts	Total Travel	Actuating Force (min)	Switch Travel Diagram	Drawing Link *
ZS-235-02Z	$;;4t[d:	Metal plunger	(2) N.C.	0.07in [1.8mm]	0.24in [6mm]	79.66 lb-in [9 N•m]	Diagram 1	PDF
ZS-235-11Z	$;;-4t[j:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
ZR-235-02Z	$;;4t[q:	Metal plunger with plastic roller	(2) N.C.	0.07in [1.8mm]			Diagram 1	PDF
ZR-235-11Z	$;;4t[y:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
Z4S-235-02Z	$;;;4t[!:	Metal plunger with fixing nuts	(2) N.C.	0.07in [1.8mm]			Diagram 1	PDF
Z4S-235-11Z	$;;4t[8:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
Z4R-235-02Z	$;;4t[9:	Metal plunger with plastic roller with fixing nuts	(2) N.C.	0.07in [1.8mm]			Diagram 1	PDF
Z4R-235-11Z	$;;4t[a:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
ZV12H-235-02Z	$;;4t[b:	Side rotary lever with plastic roller	(2) N.C.	22°	70°	1.33 lb-in [0.15 N•m]	Diagram 3	PDF
ZV12H-235-11Z	$;;4t[c:		(1) N.O./(1) N.C.				Diagram 3	PDF
ZK-235-02Z	$;;4t[e:	One-way horizontal lever with plastic roller	(2) N.C.	0.1in [2.5mm]	0.37in [9.3 mm]	79.66 lb-in [9 N•m]	Diagram 5	PDF
ZK-235-11Z	$;;;4t[f:		(1) N.O./(1) N.C.	0.14in [3.6mm]			Diagram 6	PDF
ZV7H-235-02Z	$;;4t[g:	Side rotary adjustable lever with plastic roller	(2) N.C.	22°	70°	1.33 lb-in [0.15 N•m]	Diagram 7	PDF
ZV7H-235-11Z	$;;4t[h:		(1) N.O./(1) N.C.	30°			Diagram 8	PDF
ZV10H-235-02Z	$;;-4t[i:	Side rotary adjustable 6mm plastic rod	(2) N.C.	22°	70°		Diagram 7	PDF
ZV10H-235-11Z	$;;4t[k:		(1) N.O./(1) N.C.	30°			Diagram 8	PDF

*** Weights are included on the drawing**

ZS-236-02Z

ZR-235-02Z

Z4S-235-02Z

Z4R-235-02Z

ZV12H-235-02Z

ZK-235-02Z

ZV7H-235-02Z

ZV10H-235-02Z

SCHMERSAL IEC Limit Switches

Plastic Body Limit Switches 236 Series

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" NPT conduit adapter
- Contact patterns similar to those of leading competitors

Thermoplastic Body Limit Switches 236 Series

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	$;-4t[l:	Plastic plunger	(2) N.C.	0.07in [1.8mm]	0.24in [6mm]	79.66 lb-in [9 N•m]	Diagram 1	PDF
ZS-236-11Z	$;;4t[n:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
ZR-236-02Z	$;;4t[o:	Metal plunger with plastic roller	(2) N.C.	0.07in [1.8mm]			Diagram 1	PDF
ZR-236-11Z	$;;4t[p:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
Z4S-236-02Z	$;;4t[s:	Metal plunger with fixing nuts	(2) N.C.	0.07 in [1.8 mm]			Diagram 1	PDF
Z4S-236-11Z	$;;;4t[t:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
Z4R-236-02Z	$;;4t[u:	Metal plunger with plastic roller with fixing nuts	(2) N.C.	0.07in [1.8mm]			Diagram 1	PDF
Z4R-236-11Z	$;;4t[v:		(1) N.O./(1) N.C.	0.1in [2.5mm]			Diagram 2	PDF
ZV12H-236-02Z	$;;4t[x:	Side rotary lever with plastic roller	(2) N.C.	22°	70°	1.33 lb-in [0.15 N•m]	Diagram 3	PDF
ZV12H-236-11Z	$;;4t[z:		(1) N.O./(1) N.C.				Diagram 3	PDF
ZK-236-02Z	$;;;4t[]:	One-way horizontal lever with plastic roller	(2) N.C.	0.1in [2.5mm]	0.37in [9.3mm]	79.66 lb-in [9 N•m]	Diagram 5	PDF
ZK-236-11Z	$;;;4t[[:		(1) N.O./(1) N.C.	0.14in [3.6mm]			Diagram 6	PDF
ZV7H-236-02Z-2138	$;;4t[_:	Side rotary adjustable lever with plastic roller	(2) N.C.	22°	70°	1.33 lb-in [0.15 N•m]	Diagram 3	PDF
ZV7H-236-11Z-2138	$;;4t[#:		(1) N.O./(1) N.C.	30°			Diagram 4	PDF
ZV10H-236-02Z	$;;4t[?:	Side rotary adjustable 6mm plastic rod	(2) N.C.	22°	70°		Diagram 7	PDF
ZV10H-236-11Z	$;;;4t[,:		(1) N.O./(1) N.C.	30°			Diagram 8	PDF

*** Weights are included on the drawing**

ZS-236-02Z

ZR-236-02Z

Z4S-236-02Z

Z4R-236-02Z

ZV12H-236-02Z

ZK-236-02Z

ZV7H-236-02Z-2138

ZV10H-236-02Z

SCHMERSAL 235/236 Series Travel Diagrams

Switch Travel Diagrams

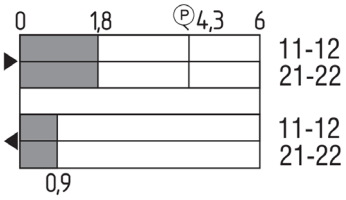


Diagram 1

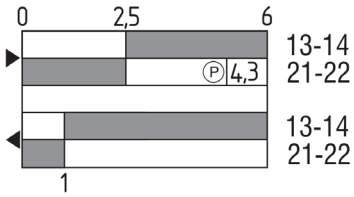


Diagram 2

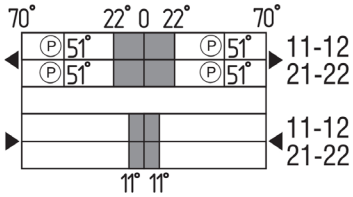


Diagram 3

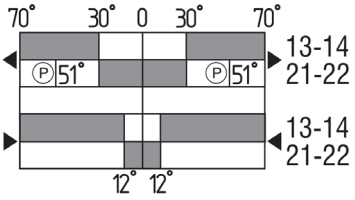


Diagram 4

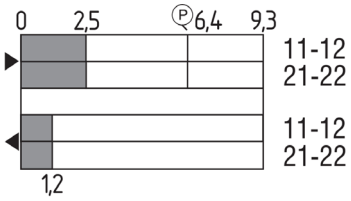


Diagram 5

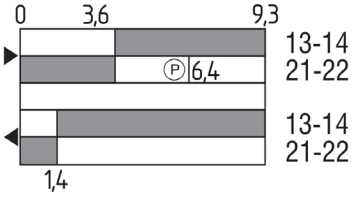


Diagram 6

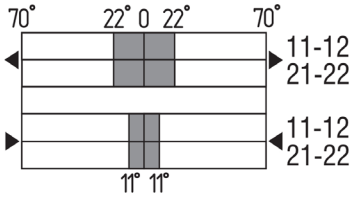


Diagram 7

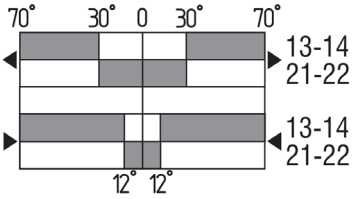


Diagram 8

Contact Travel Diagrams

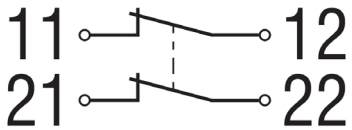


Diagram 1

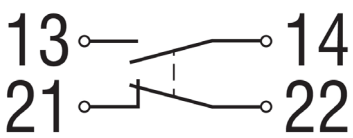


Diagram 2

SCHMERSAL 235/236 Series Specifications

235/236 Series Specifications			
Series		***235***	***236***
Environmental			
Degree of Protection		IP67	
Temperature Range		-30 to 80°C [-22 to 176°F]	
Mechanical Ratings			
Body Footprint (Without Actuator Head)		30 x 30 x 63.5mm	30 x 30 x 58.5mm
Mechanical Life		20 Million Operations	
Conduit Entrance		M20 x 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 @ 230VAC Continuous: 10A @ 230VAC Required 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 in-lb [0.8 N•m]	
Safety Data			
General		02Z Series - Safety Function, Yes: Number of Safety Contacts: 2 11Z 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 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	

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

SCHMERSAL IEC Limit Switches

Metal Body Limit Switches 335 Series

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

Metal Body Limit Switches 335 Series								
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	$;4t_0:	Metal plunger	(1) N.O./(1) N.C.	0.8in [2.0mm]	0.24in [6mm]	106.2 lb-in [12 N•m]	Diagram 1	PDF
ZR-335-11Z	$;4t_1:	Metal plunger with plastic roller	(1) N.O./(1) N.C.					PDF
Z4VH-335-02Z	$;4t_2:	Side rotary lever with plastic roller	(2) N.C.	19º	80º	2.3 lb-in [0.26 N•m]	Diagram 2	PDF
Z4VH-335-11Z	$;4t_3:		(1) N.O./(1) N.C.	24º			Diagram 3	PDF
Z1K-335-11Z	$;4t_4:	One-way horizontal lever with plastic roller	(1) N.O./(1) N.C.	0.82in [2.1mm]	0.25in [6.3mm]	106.2 lb-in [12 N•m]	Diagram 4	PDF
Z4V7H-335-02Z	$;4t_5:	Side rotary adjustable lever with plastic roller	(2) N.C.	19º	80º	1.33 lb-in [0.15 N•m]	Diagram 5	PDF
Z4V7H-335-11Z	$;4t_6:		(1) N.O./(1) N.C.	24º			Diagram 6	PDF
Z4V10H-335-02Z	$;4t_7:	Side rotary adjustable 6mm plastic rod	(2) N.C.	19º			Diagram 5	PDF
Z4V10H-335-11Z	$;4t_8:		(1) N.O./(1) N.C.	24º			Diagram 6	PDF

*** Weights are included on the drawing**

ZS-335-11Z

ZR-335-11Z

Z4VH-335-02Z

Z1K-335-11Z

Z4V7H-335-02Z

Z4V10H-335-02Z

SCHMERSAL IEC Limit Switches

Plastic Body Limit Switches 336 Series

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

Plastic Body Limit Switches 336 Series								
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	$;4t_9:	Metal plunger	(1) N.O./(1) N.C.	0.08in [2.0mm]	0.24in [6mm]	106.2 lb-in [12 N•m]	Diagram 1	PDF
ZR-336-11Z	$;4t_a:	Metal plunger with plastic roller	(1) N.O./(1) N.C.					PDF
Z4VH-336-02Z	$;4t_b:	Side rotary lever with plastic roller	(2) N.C.	19°	80°	2.3 lb-in [0.26 N•m]	Diagram 2	PDF
Z4VH-336-11Z	$;4t_c:		(1) N.O./(1) N.C.	24°			Diagram 3	PDF
Z1K-336-11Z	$;4t_d:	One-way horizontal lever with plastic roller	(1) N.O./(1) N.C.	0.82in [2.1mm]	0.25in [6.3mm]	106.2 lb-in [12 N•m]	Diagram 4	PDF
Z4V7H-336-02Z	$;4t_e:	Side rotary adjustable lever with plastic roller	(2) N.C.	19°	80°	1.33 lb-in [0.15 N•m]	Diagram 5	PDF
Z4V7H-336-11Z	$;;4t_f:		(1) N.O./(1) N.C.	24°			Diagram 6	PDF
Z4V10H-336-02Z	$;4t_g:	Side rotary adjustable 6mm plastic rod	(2) N.C.	19°			Diagram 5	PDF
Z4V10H-336-11Z	$;4t_h:		(1) N.O./(1) N.C.	24°			Diagram 6	PDF

*** Weights are included on the drawing**

ZS-336-11Z

ZR-336-11Z

Z4VH-336-02Z

Z1K-336-11Z

Z4V7H-336-02Z

Z4V10H-336-02Z

SCHMERSAL 335/336 Series Travel Diagrams

Switch Travel Diagrams

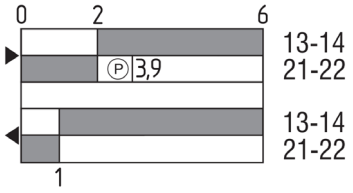


Diagram 1

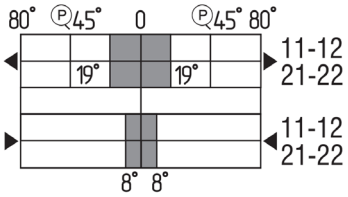


Diagram 2

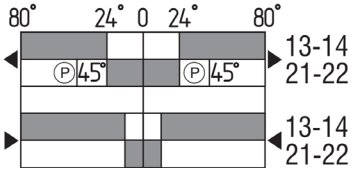


Diagram 3

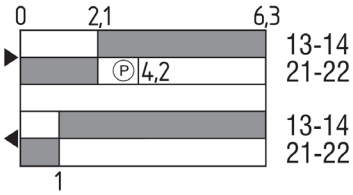


Diagram 4

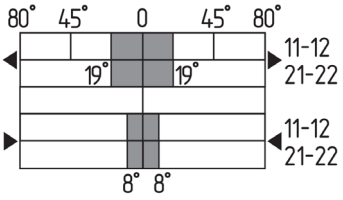


Diagram 5

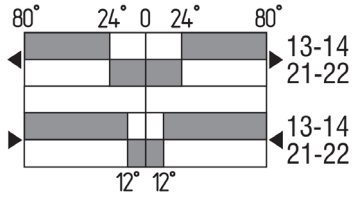


Diagram 6

Contact Travel Diagrams

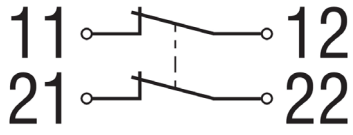


Diagram 1

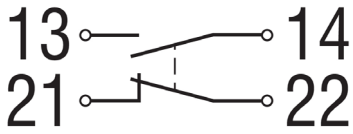


Diagram 2

SCHMERSAL

335/336 Series Specifications

335/336 Series Specifications			
Series		***335***	***336***
Environmental			
Degree of Protection		IP67	
Temperature Range		-30 to 80°C [-22 to 176°F]	
Mechanical Ratings			
Body Footprint (Without Actuator Head)		40.5 x 38 x 66.5mm	
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, self-extinguishing
Contact Blocks Rating			
Rated Impulse Withstand Voltage		6 kV	
Electrical Ratings	***AC***	AC-15 - 4A @ 230VAC Continuous: 10A @ 230VAC Required rated short-circuit current to EN60947-5-1 : 1,000A	
	DC	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, N.C. contacts with positive break	
Wiring Connections		AWG #14 through AWG #18 Wire	
Torque Requirements		Wiring Terminals: 7.1 in-lb [0.8 N•m]	
Safety Data			
General		02Z Series - Safety Function, Yes: Number of Safety Contacts: 2 11Z 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 E57648 all versions. All units are CE and Reach Compliant Standards: IEC 60947-5-1 : 2010, ISO 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.**

SCHMERSAL Compact Limit Switches

Compact Limit Switches PS116 Series

PS116Z11-STRR200

Features

- Metal top with thermoplastic body
- (1) N.O./(1) N.C. contact on all units
- 45-degree adjustable head
- Lever angle models adjustable 15° steps
- IP66, IP67

Compact Limit Switches PS116 Series								
Part Number	***Price***	***Drawing Link and Weights***	***Action***	***Actuator Type***	***Min. Actuating Speed mm/min***	***Max. Actuating Speed m/s***	***Switch Travel / Contact Diagram***	***Connection Type***
PS116Z11-L200S200	$5vqy:	PDF	Snap	Plastic plunger	10	0.5	2 / 2	6.5ft/2m pigtail,bottom exit
PS116Z11-LR200S200	$5vqz:	PDF					2 / 2	6.5ft/2m pigtail, right exit
PS116Z11-STS200	$;5vq]:	PDF					2 / 2	(1) 4-pin M12 quick-disconnect, bottom exit
PS116Z11-STRS200	$;5vq[:	PDF					2 / 2	(1) 4-pin M12 quick-disconnect, right exit
PS116T11-L200S200	$5vq_:	PDF	Slow action break before make		60		4 / 1	6.5ft/2m pigtail, bottom exit
PS116T11-STRS200	$5vs6:	PDF					4 / 1	(1) 4-pin M12 quick-disconnect, right exit
PS116Z11-LR200R200	$5vs8:	PDF	Snap	Plunger with plastic roller	10		2 / 2	6.5ft/2m pigtail, right exit
PS116Z11-L200R200	$5vs7:	PDF					2 / 2	6.5ft/2m pigtail,bottom exit
PS116Z11-STR200	$5vs9:	PDF					2 / 2	(1) 4-pin M12 quick-disconnect, bottom exit
PS116Z11-STRR200	$5vsa:	PDF					2 / 2	(1) 4-pin M12 quick-disconnect, right exit
PS116T11-L200R200	$5vq#:	PDF	Slow action break before make		60		4 / 1	6.5ft/2m pigtail, bottom exit
PS116T11-STRR200	$;5vq!:	PDF					4 / 1	(1) 4-pin M12 quick-disconnect, right exit
PS116Z11-L200H200	$5vq?:	PDF	Snap	Side rotary lever with plastic roller	10	1	1 / 2	6.5ft/2m pigtail, bottom exit
PS116Z11-LR200H200	$;5vq,:	PDF					1 / 2	6.5ft/2m pigtail, right exit
PS116Z11-STH200	$5vs0:	PDF					1 / 2	(1) 4-pin M12 quick-disconnect, bottom exit
PS116Z11-STRH200	$5vsb:	PDF					1 / 2	(1) 4-pin M12 quick-disconnect, right exit
PS116T11-L200H200	$5vsc:	PDF	Slow action break before make		60		3 / 1	6.5ft/2m pigtail, bottom exit
PS116T11-STRH200	$5vsd:	PDF					3 / 1	(1) 4-pin M12 quick-disconnect, right exit
PS116Z11-L200N200	$5vse:	PDF	Snap	Side rotary adjustable lever with plastic roller	10		1 / 2	6.5ft/2m pigtail, bottom exit
PS116Z11-LR200N200	$;5vsf:	PDF					1 / 2	6.5ft/2m pigtail, right exit
PS116Z11-STN200	$5vs1:	PDF					1 / 2	(1) 4-pin M12 quick-disconnect, bottom exit
PS116Z11-STRN200	$5vs2:	PDF					1 / 2	(1) 4-pin M12 quick-disconnect, right exit
PS116T11-L200N200	$5vs3:	PDF	Slow action break before make		60		3 / 2	6.5ft/2m pigtail, bottom exit
PS116T11-STRN200	$5vs4:	PDF					3 / -	(1) 4-pin M12 quick-disconnect, right exit
PS116Z11-L200J200	$5vs5:	PDF	Snap	Side rotary adjustable plastic rod	10		5 / 2	6.5ft/2m pigtail, bottom exit
PS116Z11-LR200J200	$5vsg:	PDF						6.5ft/2m pigtail, right exit
PS116Z11-STJ200	$5vsh:	PDF						(1) 4-pin M12 quick-disconnect, bottom exit

SCHMERSAL Compact Limit Switches PS116 Series

PS116Z11-LR200S200

PS116Z11-STH200

PS116Z11-STRN200

PS116Z11-STJ200

Compact Limit Switches Specifications PS116 Series		
Technical Data		
Standards		IEC 60947-5-1
Degree of Protection		IP66, IP67
Protection Rating		II
Degree of Pollution		3
Temperature Range		-30 to 80°C [-22 to 176°F]
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 Ie/Ue	***Connecting Cable, 4 core:***	3A / 240VAC, 1.5 A 24VDC
	Connector Plug M12 4-pole	1.5 A / 240VAC, 1.5 A 24VDC
Rated Impulse Withstand Voltage Uimp	***Connecting Cable, 4 core:***	4kV
	Connector Plug M12 4-pole	2.5 kV
Rated Insulation Voltage Ui	***Connecting Cable, 4 core:***	300V
	Connector Plug M12 4-pole	300V
Thermal Test Current Ithe	***Connecting Cable, 4 core:***	5A
	Connector Plug M12 4-pole	2.5 A
Maximum Fuse Rating		6 AgG 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.**

SCHMERSAL Compact Limit Switches PS116 Series

Switch Travel Diagrams

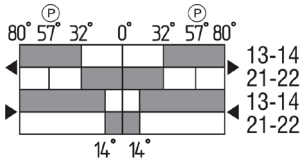


DIAGRAM 1

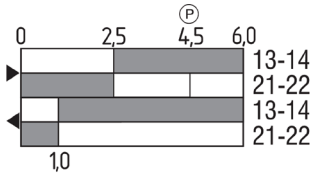


DIAGRAM 2

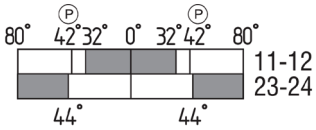


DIAGRAM 3

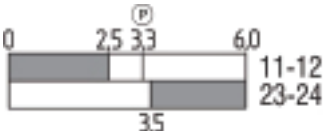


DIAGRAM 4

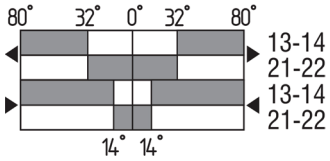


DIAGRAM 5

Contact Travel Diagrams

Slow Action

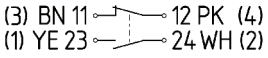


DIAGRAM 1

Snap Action

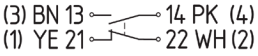
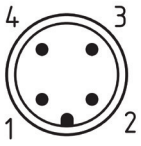


DIAGRAM 2

M12 Connector



SCHMERSAL Heavy Duty Limit Switches

Cast Iron Limit Switches 250 Series

Overview

The Schmersal heavy duty cast iron limit switches offer a variety of actuator options, including side rotary levers with metal or plastic rollers, metal belt alignment rollers, or high-temperature models with metal rollers. They are IP65, IP66, and IP67 rated and have up to 2 conduit entries.

Belt alignment switches are actuated when the conveyor belt becomes misaligned. Depending on the plant arrangements, this signal can be used to switch the equipment off or to provide automatic correction of the belt alignment. The actuator arm contains a heavy duty roller and can be actuated to either side. Material handling applications often need special purpose switches for belt alignment. Many feature the heavy duty limit switch housings with uniquely designed actuators for these purposes.

Features

- Cast iron enclosure
- (2) M25 x 1.5 cable entry connection
- Available in snap action and slow action contacts
- IP65 IP66 IP67 protection rating
- High temperature models available -40 to 200°C [-40 to 392°F]

MD250-11Z

TD250-02/02Z-RMS

M.250-22Z-1224

TD250-10/10Z-T

Cast Iron Limit Switches 250 Series									
Part Number	*Price*	*Actuator Type*	*Snap Action Contacts*	*Slow Action Contacts*	*Travel Diagram*	*Total Travel*	*Actuating Force (min)*	*Weight (lbs)*	*Drawing Link*
MD250-11Z	$-06cja:	Side rotary lever with plastic roller	(1) N.O./(1) N.C.	—	1	90°	40N	8.5	PDF
MD250-22Z	$-06cjb:		(2) N.O./(2) N.C.	—	2			8.75	PDF
TD250-02/02Z	$-06cjc:		—	(2) N.C. left and (2) N.C. right	3			9.66	PDF
TD250-11/11Z	$-06cjd:		—	(1) N.O./(1) N.C. left and (1) N.O./(1) N.C. right	4			9.17	PDF
TD250-02Z	$-06cje:		—	(2) N.C.	5			9.66	PDF
TD250-02/02Z-RMS	$;-06cjf:	Side rotary lever with metal roller	—	(2) N.C. left and (2) N.C. right	3			10.19	PDF
Belt Alignment Models									
M.250-11Z-1224	$-06cjg:	Side rotary lever with metal belt roller	(1) N.O./(1) N.C.	—	1	90°	40N	9.74	PDF
M.250-22Z-1224	$-06cjh:		(2) N.O./(2) N.C.	—	2			9.71	PDF
T.250-02Z-H-966	$--06cji:		—	(2) N.C.	5			8.37	PDF
High Temperature Models									
TD250-10/10Z-T	$--06cjj:	Side rotary lever with metal roller	—	(1) N.O. left and (1) N.O. right	6	90°	40N	9.62	PDF
MD250-11Z-T	$-06cjk:		(1) N.O./(1) N.C..	—	1			8.64	PDF

SCHMERSAL Heavy Duty Limit Switches

Cast Iron Limit Switches 250 Series Specifications			
Series		***Snap Action***	***Slow Action***
Impact Energy (maximum)		7 J	
Actuating Speed (maximum)		3 m/s	
Enclosure Material		Cast iron (galvanized and painted)	
Contact Material		Gold-plated silver	
Thermal Current		16A	
Short Circuit Current		1,000A	
Bounce Duration (maximum)		5ms	
Switching Frequency (maximum)		3,000/h	
Switchover Time (maximum)		35ms	
Rated Impulse Withstand Voltage		4kV	6kV
Electrical Data - Contacts	***Voltage AC-15***	400 VAC (M.250-11Z-1224 and MD250-11Z 230 VAC)	
	Current AC-15	4A (M.250-11Z-1224 and MD250-11Z 2.5 A)	
Contact Type		Snap action: change-over contact, up to 250 V, with 2 galvanic separated contact bridges	Slow action: change-over contact, up to 250 V, with 2 galvanic separated contact bridges, positive break NC contacts A
Conduit Entrance		(2) M25 x 1.5 cable entry	
Connection		Screw terminals M 3.5 2.5 mm² (including conductor ferrules)	
Torque Requirements		1N•m	
Mechanical Life		5 million operations	10 million operations
Degree of Protection		IP65 IP66 IP67	
Temperature Range		-30 to 90°C [-22 to 194°F] TD250-10/10Z-T, and MD250-11Z-T -40 to 200°C [-40 to 392°F]	
Agency Approvals*		cULus 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.**

Travel Diagrams

Diagram 1
Snap Action
1 N.O. / 1 N.C.

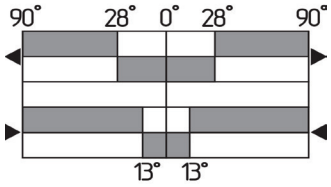


Diagram 2
Snap Action
2 N.O. / 2 N.C.

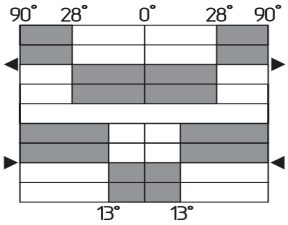


Diagram 3
Slow Action
2 N.C. Left, 2 N.C. Right

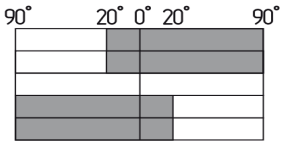


Diagram 4
Slow Action
1 N.O. / 1 N.C. Left
1 N.O. / 1 N.C. Right

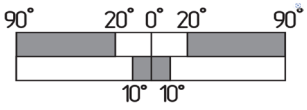


Diagram 5
Slow Action
2 N.C.

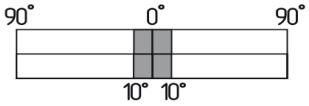
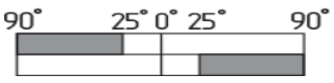


Diagram 6
Slow Action
1 N.O. Left / 1 N.O. Right



IEC Limit Switches

Heavy-duty IEC Limit Switches ABM Series

- 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" 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

Heavy-duty IEC Limit Switches ABM 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•m)	Min. Positive Opening Force (N) /torque (N•m)	Photo
ABM1E11Z11	$088q:	PDF	Stainless steel plunger	1	PG13.5	0.5	30N	45N	A
ABM2E11Z11	$088s:	PDF		1	1/2" NPT	0.5	30N	45N	A
ABM5E11Z11	$;088t:	PDF		3	PG13.5	0.5	30N	45N	B
ABM6E11Z11	$088u:	PDF		3	NPT	0.5	30N	45N	B
ABM2E13Z11	$088x:	PDF	Stainless steel plunger with roller	1	1/2" NPT	0.5	22N	40N	C
ABM6E13Z11	$088z:	PDF		3	1/2" NPT	0.5	22N	40N	D
ABM1E32Z11	$-088l:	PDF	One-way lever with stainless steel roller	1	PG13.5	1.5	12N	40N	E
ABM2E32Z11	$088n:	PDF		1	1/2" NPT	1.5	12N	40N	E
ABM5E32Z11	$088o:	PDF		3	PG13.5	1.5	12N	40N	F
ABM6E32Z11	$088p:	PDF		3	1/2" NPT	1.5	12N	40N	F
ABM1E42Z11	$088h:	PDF	Rotary lever with stain. steel roller (See accessories for opt. roller and actuator levers)	1	PG13.5	1.5	0.15 N•m	0.30 N•m	G
ABM2E42Z11	$-088i:	PDF		1	1/2" NPT	1.5	0.15 N•m	0.30 N•m	G
ABM5E42Z11	$-088j:	PDF		3	PG13.5	1.5	0.15 N•m	0.30 N•m	H
ABM6E42Z11	$088k:	PDF		3	1/2" NPT	1.5	0.15 N•m	0.30 N•m	H
ABM1E52Z11	$088d:	PDF	Adj. rotary lever w/ stainless steel roller (See accessories for opt. roller and actuator levers)	1	PG13.5	1.5	0.15 N•m	0.30 N•m	I
ABM2E52Z11	$088e:	PDF		1	1/2" NPT	1.5	0.15 N•m	0.30 N•m	I
ABM5E52Z11	$;088f:	PDF		3	PG13.5	1.5	0.15 N•m	0.30 N•m	J
ABM6E52Z11	$088g:	PDF		3	NPT	1.5	0.15 N•m	0.30 N•m	J
ABM1E71Z11	$;088]:	PDF	Adjustable rotary lever w/ stainless steel rod	1	PG13.5	1.5	0.15 N•m	0.30 N•m	K
ABM2E71Z11	$;088[:	PDF		1	1/2" NPT	1.5	0.15 N•m	0.30 N•m	K
ABM5E71Z11	$088_:	PDF		3	PG13.5	1.5	0.15 N•m	0.30 N•m	L
ABM6E71Z11	$088#:	PDF		3	1/2" NPT	1.5	0.15 N•m	0.30 N•m	L
ABM1E92Z11	$;087,:	PDF	Wobble lever w/ polyamide tip stainless steel spring	1	PG13.5	1.0	0.18 N•m	-	M
ABM2E92Z11	$0880:	PDF		1	1/2" NPT	1.0	0.18 N•m	-	M
ABM6E92Z11	$0882:	PDF		3	1/2" NPT	1.0	0.18 N•m	-	N
ABM1E93Z11	$087_:	PDF	Wobble lever w/ stainless steel spring	1	PG13.5	1.0	0.18 N•m	-	O
ABM2E93Z11	$087#:	PDF		1	1/2" NPT	1.0	0.18 N•m	-	O
ABM6E93Z11	$087?:	PDF		3	1/2" NPT	1.0	0.18 N•m	-	P


A


B


C


D


E


F


G


H


I


J


K


L


M


N


O


P

IEC Limit Switches

Double Insulated Limit Switches ABP Series

- Featuring an electrically isolated PBT body for corrosive environments
- Single conduit openings in 1/2" 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

Double Insulated Limit Switches 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•m)*	*Min. Positive Opening Force (N) Torque (N•m)*	*Photo*
ABP1H14Z11	$087p:	PDF	Galvanized steel plunger	1	PG13.5	0.5	14N	40N	A
ABP2H14Z11	$087q:	PDF			1/2" NPT	0.5	14N	40N	A
ABP1H19Z11	$;087t:	PDF	Galvanized steel plunger with roller		PG13.5	0.5	14N	40N	B
ABP2H19Z11	$087u:	PDF			1/2" NPT	0.5	14N	40N	B
ABP1H35Z11	$-087l:	PDF	One-way lever with polyamide roller		PG13.5	1.0	8N	30N	C
ABP2H35Z11	$087n:	PDF			1/2" NPT	1.0	8N	30N	C
ABP1H41Z11	$;087]:	PDF	Side rotary lever with polyamide roller		PG13.5	1.5	0.15 N•m	0.30 N•m	D
ABP2H41Z11	$;087[:	PDF			1/2" NPT	1.5	0.15 N•m	0.30 N•m	D
ABP1H51Z11	$087x:	PDF	Side rotary adjustable lever with polyamide roller		PG13.5	1.5	0.15 N•m	0.30 N•m	E
ABP2H51Z11	$087y:	PDF			1/2" NPT	1.5	0.15 N•m	0.30 N•m	E
ABP1H71Z11	$;086[:	PDF	Side rotary with stainless steel rod		PG13.5	1.5	0.15 N•m	0.30 N•m	F
ABP2H71Z11	$086_:	PDF			1/2" NPT	1.5	0.15 N•m	0.30 N•m	F
ABP1H92Z11	$-080l:	PDF	Wobble lever w/ polyamide tip stainless steel spring		PG13.5	1.0	0.18 N•m	-	G
ABP2H92Z11	$080n:	PDF			1/2" NPT	1.0	0.18 N•m	-	G
ABP1H93Z11	$-080j:	PDF	Wobble lever w/ stainless steel spring		PG13.5	1.0	0.18 N•m	-	H
ABP2H93Z11	$080k:	PDF			1/2" NPT	1.0	0.18 N•m	-	H


A


B


C

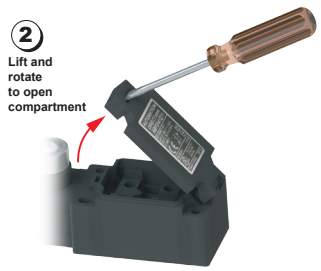

D


E


F


G


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*
AGZ11-SWITCH	$88c:	Snap action (1) N.O. and (1) N.C.	3ms change-over time
AGZ02-SWITCH	$88b:	Snap action (2) N.C.	3ms change-over time
AGX11-SWITCH	$889:	Slow action (1) N.O. and (1) N.C.	Break before make
AGY11-SWITCH	$88a:	Slow action overlay (1) N.O. and (1) N.C.	Make before break
AGW02-SWITCH	$887:	Slow action delay (2) N.C.	Simultaneous
AGW20-SWITCH	$888:	Slow action overlay (2) N.O.	Simultaneous

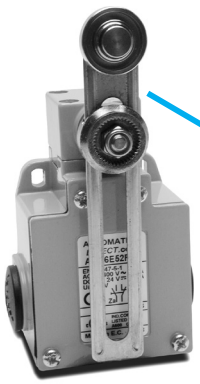
Additional Lever Arms, Spare Parts and Accessories for ABM Series

Additional Lever Arms/Spare Parts and Accessories			
Part Number	*Price*	*Drawing Link*	*Actuator Type*
AGE42-LEVER	$883:	PDF	Lever with stainless steel roller for E42 models (replacement lever)
AGE44-LEVER	$884:	N/A	Lever with 50mm diameter rubber roller (fits E42 models)
AGE52-LEVER	$885:	PDF	Lever with stainless steel roller for E52 models (replacement lever)
AGE54-LEVER	$886:	PDF	Lever with 50mm diameter rubber roller (fits E52 models)

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

Replacement actuator levers for heavy-duty IEC models
Easily-replaceable actuators for E42 and E52 model limit switches.

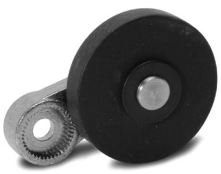
Note: These models have an E42 or E52 in the part number, for example, ABM1E42Z11.



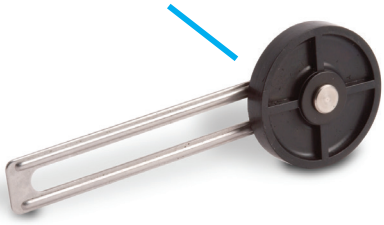
AGE52-LEVER

(Replacement lever shown installed on ABM5E52Z11 limit switch)

AGE44-LEVER



AGE54-LEVER



AchieVe™ IEC Limit Switches

Plastic 50mm IEC Limit Switches ADP Series

- 90-degree adjustable, head, levers are adjustable 10° on the operating shaft
- Snap action contacts (1) N.O./(1) N.C. on each unit
- Reinforced thermoplastic housing
- Wide offering of head actuators
- IP65

Plastic 50mm IEC Limit Switches ADP Series 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	$;5[nz:	Metal plunger with metal roller	0.3 ms	12N	30N	4.7 mm [0.18 in]	9.6 mm [0.37 in]	1	(2) PG11 cable entries with (1) 1/2in NPT adapter	PDF
ADP2T14Z11	$;;5[n]:	Metal plunger with metal roller and dust cap	0.5 ms	15N	30N	2.5 mm [0.09 in]	5.6 mm [0.22 in]	2		PDF
ADP2T35Z11	$;;5[n[:	One-way horizontal lever with metal roller and dust cap	1ms	7N	24N	9mm [0.35 in]	21mm [0.82 in]	3		PDF
ADP2T41Z11	$;5[n_:	Side rotary lever with 18mm nylon roller	1.5 ms	0.1 N•m	0.32 N•m	31°	74°	4		PDF
ADP2T45Z11	$;5[n#:	Side rotary lever inward with 18mm nylon roller								PDF
ADP2T51Z11	$;;5[n!:	Side rotary adjustable lever with 18mm nylon roller								PDF
ADP2T5100Z11	$;5[n?:	Side rotary 2mm step adjustable lever with 18mm nylon roller								PDF
ADP2T71Z11	$;;5[n,:	Side rotary adjustable 3mm stainless steel rod								PDF

*** Weights are included on the drawing.**

ADP2T13Z11

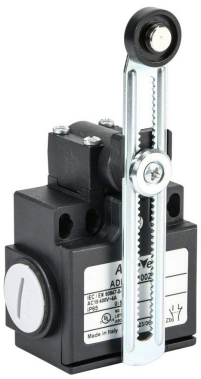
ADP2T14Z11

ADP2T35Z11

ADP2T41Z11

ADP2T45Z11

ADP2T51Z11



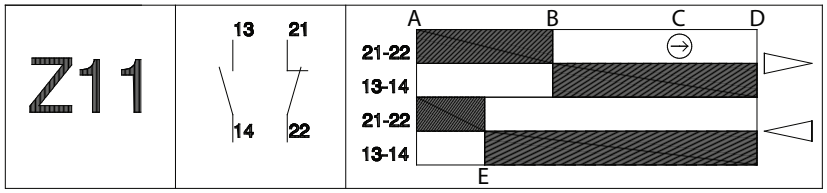
ADP2T5100Z11

ADP2T71Z11

Achieve™ IEC Limit Switches

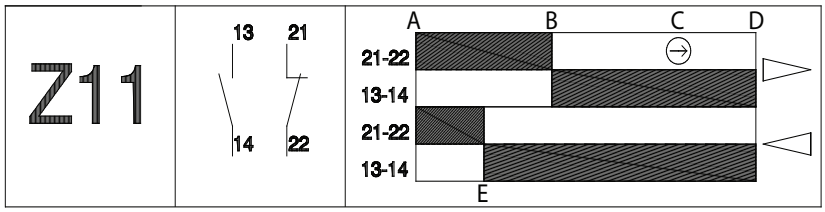
Travel Diagrams

Diagram 1



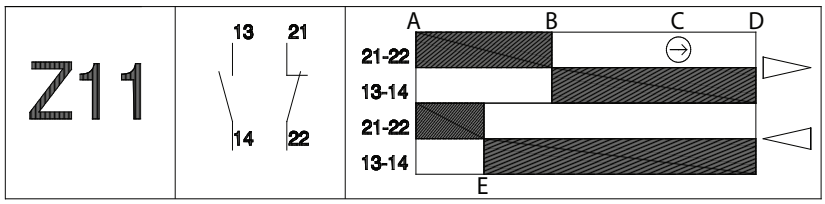
TAG	mm
A	0
B	4.7
C	7.6
D	9.6
E	2.5

Diagram 2



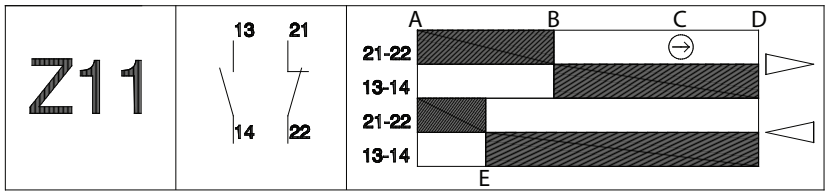
TAG	mm
A	0
B	2.5
C	4.1
D	5.6
E	1.3

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

AchieVe™ IEC Limit Switches

Metal 50mm IEC Limit Switches ADM Series

- 90-degree adjustablehead, levers are adjustable 10º on the operating shaft
- Snap-action contacts (1) N.O./(1) N.C. on each unit
- Metal enclosure
- Wide offering of head actuators
- IP66; part number ADM2T93Z11 is IP65

Metal 50mm IEC Limit Switches ADM Series 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 *
ADM2F11Z11	$;5[o0:	Metal plunger	0.5 ms	15N	30N	2.5 mm [0.09 in]	5.6 mm [0.22 in]	2	(3) 1/2in NPT entries	PDF
ADM2F12Z11	$;5[o1:	Metal plunger with metal roller	0.3 ms	12N	30N	4.7 mm [0.18 in]	9.6 mm [0.37 in]	1		PDF
ADM2T35Z11	$;5[o2:	One-way horizontal lever with metal roller and dust cap	1ms	7N	24N	9mm [0.35 in]	21mm [0.82 in]	3		PDF
ADM2F43Z11	$;5[o3:	Side rotary lever with 18mm metal roller	1.5 ms	0.1 N•m	0.32 N•m	31º	74º	4		PDF
ADM2F46Z11	$;5[o4:	Side rotary lever inward with 18mm metal roller								PDF
ADM2F53Z11	$;5[o5:	Side rotary adjustable metal lever with 18mm metal roller								PDF
ADM2F71Z11	$;5[o6:	Side rotary adjustable 3mm stainless steel rod								PDF
ADM2T93Z11	$;5[o7:	360 degree stainless steel spring	1ms	0.12 N•m	N/A	23º	23º	5		PDF
ADM2T9805Z11A	$;5[o8:	Pull action with ring	0.5 ms	30N		2.0 mm [0.07 in]	5.6 mm [0.22 in]	6		PDF

*** Weights are included on the drawing.**

ADM2F11Z11

ADM2F12Z11

ADM2T35Z11

ADM2F43Z11

ADM2F46Z11

ADM2F53Z11

ADM2F71Z11

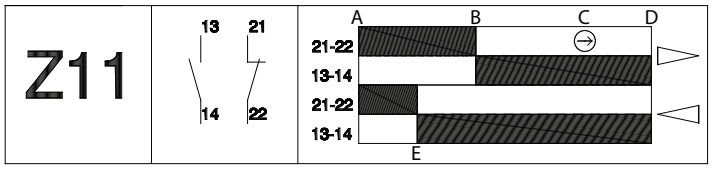
ADM2T93Z11

ADM2T9805Z11A

Achieve™ IEC Limit Switches

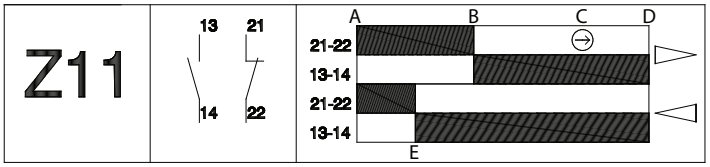
Travel Diagrams

Diagram 1



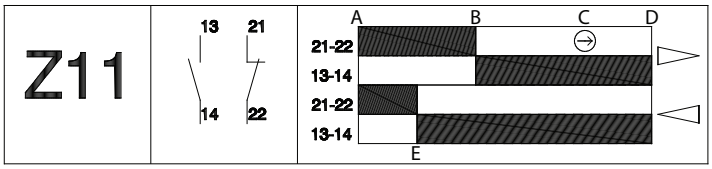
TAG	mm
A	0
B	4.7
C	7.6
D	9.6
E	2.5

Diagram 2



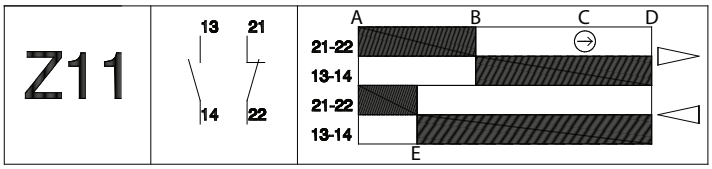
TAG	mm
A	0
B	2.5
C	4.1
D	5.6
E	1.3

Diagram 3



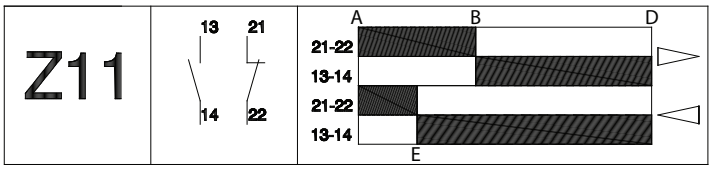
TAG	mm
A	0
B	9
C	14.5
D	21
E	4.9

Diagram 4



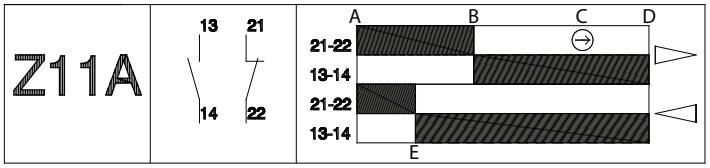
TAG	degree
A	0
B	31
C	47
D	74
E	17

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

IEC Limit Switches Specifications

IEC Limit Switches Specifications			
Series		**AAM, AAP, ABM, ABP**	**ADM, ADP**
Environmental			
Degree of Protection		Plastic models: IP65 according to IEC 529 Metal models: IP66 according to IEC 144-CEI70-1; part number ADM2T93Z11 is IP65	
Temperature Range [1]	**Plastic Models**	Storage: -30 to 80°C [-22 to 176° F] Operating: -25 to 70°C [-13 to 158°F];	
	Metal Models	Storage: -30 to 80°C [-22 to 176°F] Operating: -10 to 70°C [14 to 158°F]; part number ADM2T9805Z11A -40 to 70°C [-40 to 158°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° 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-V0 class (UL94); 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**	Make: 60A@120VAC; 30A @ 240VAC; 18A @ 400VAC Break:10A @ 24VAC; 6.5 A @130VAC; 3.1 A @ 230VAC; 1.8 A @ 400VAC	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 mΩ	
Recommended Min. Operating Speed		With snap-action contacts: 20mm per minute [4] With slow-action contacts: 500mm per minute [5]	20mm per minute
Rated Insulation Voltage		690V	500V
Terminals Marking		According to CENELEC EN 50013	According to IEC 60947-5-1
Wiring Connections		2 x 2.5mm² (AWG14) to 2 x 0.5mm² (AWG18)	18-14 AWG [0.75 to 2.5 mm²]
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	

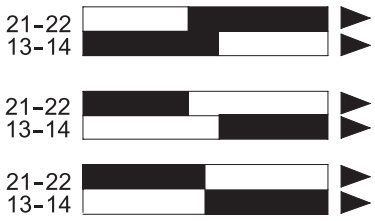
[1] **Minimum temperatures assume that the atmosphere is free of moisture, which could cause moving parts to freeze up.**
[2] **Some types of actuators, such as a long, heavy spring with the adjustable actuator fully extended, may not work properly if installed in a horizontal position.**
[3] **Positive 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 1ms to 3ms from maximum to minimum operating speed.**
[5] **Slow-action contacts must not be operated at very low speeds because of the tendency to maintain the arc if contacts are not rapidly separated.**

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.



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**

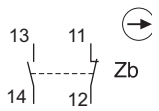
Note: Green/yellow wire is physical earth ground.

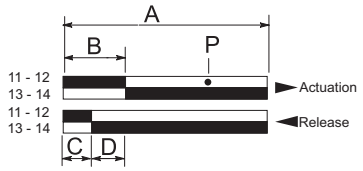
= Contact open

= Contact closed

Contacts Configuration

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





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

B =Tripping travel of both contacts on actuation

C = Tripping travel of both contacts on release

D = Differential travel (between actuation and release)

P = Point from which positive opening is assured during actuation

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

Bar Chart Examples
(cam angle is 30 degrees)

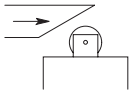
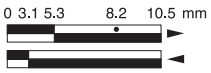


Diagram in millimeters/cam travel



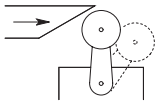
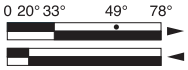


Diagram in degrees/lever rotation



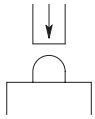
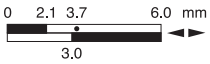
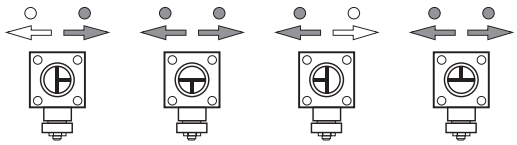


Diagram in millimeters/plunger travel

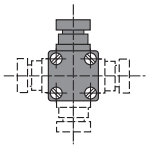


Changeable working heads (E42, E52, E71) models; view of cam insert when looking at bottom of head once removed from switch body.

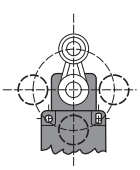
To change position, push in and twist until it locks into place



Positioning - 90° each way



Adjustable lever from 0-360°, 6° each increment



AchieVe™ IEC Limit Switches

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

- 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

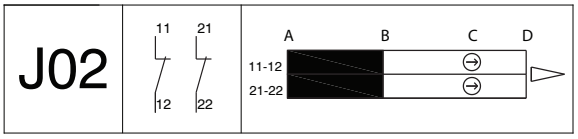
IEC Limit Switch With Remote Reset - 24VDC AHP Series Selection Chart

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 *
Plastic Enclosure with 1m Cable										
AHP2R002J02-024	$;5[oq:	Plastic plunger	1ms	15N	30N	2.4 mm [0.09 in]	4.5 mm [0.17 in]	1	(2) PG11 and (1) 1/2in NPT cable entries	PDF
AHP2T11J02-024	$;5[os:	Metal plunger	0.5 ms	15N	30N	2.4 mm [0.09 in]	4.5 mm [0.17 in]			PDF
AHP2T12J02-024	$;;5[ot:	Metal plunger with metal roller	0.3 ms	12N	30N	4.5 mm [0.17 in]	7.8 mm [0.30 in]	2		PDF
AHP2T30J02-024	$;5[ou:	One-way horizontal lever with 12.5mm plastic roller	1ms	7N	24N	8.6 mm [0.33 in]	17.5 mm [0.68 in]	3		PDF
AHP2T32J02-024	$;5[ov:	One-way vertical lever with 12.5mm plastic roller								PDF
AHP2T41J02-024	$;5[ox:	Side rotary lever with 18mm nylon roller	1.5 ms	0.1 N•m	0.32 N•m	30°	62°	4		PDF
AHP2T5100J02-024	$;5[oy:	Side rotary 2mm step adjustable lever with 18mm nylon roller								PDF
AHP2T5200J02-024	$;5[oz:	Side rotary 2mm step adjustable lever with 50mm nylon roller								PDF

*** Weights are included on the drawing.**

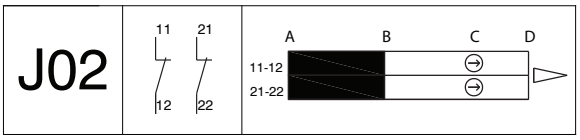
Travel Diagrams

Diagram 1



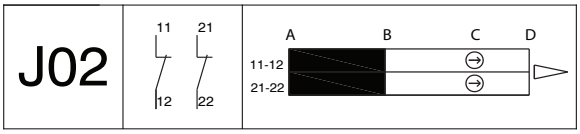
TAG	mm
A	0
B	2.4
C	4
D	4.5

Diagram 2



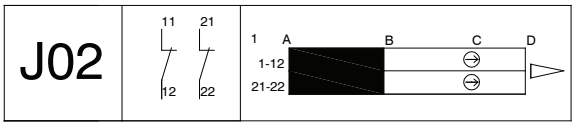
TAG	mm
A	0
B	4.5
C	7.4
D	7.8

Diagram 3



TAG	mm
A	0
B	8.6
C	13.1
D	17.5

Diagram 4

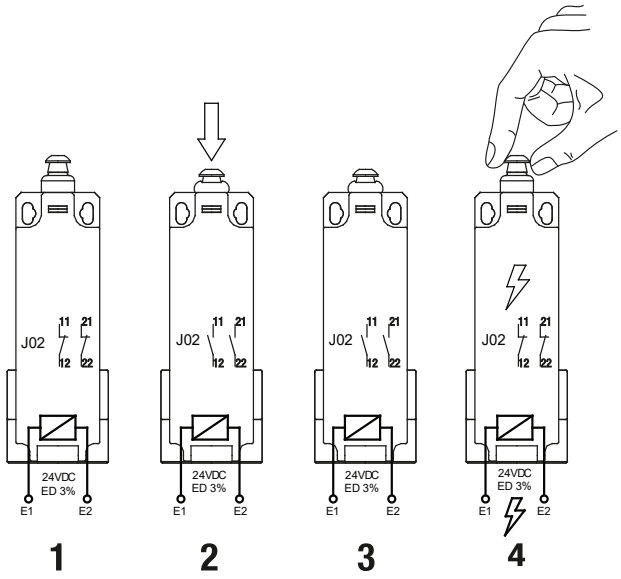


TAG	degree
A	0
B	30
C	46
D	62

IEC Limit Switches With Remote Reset 24VDC

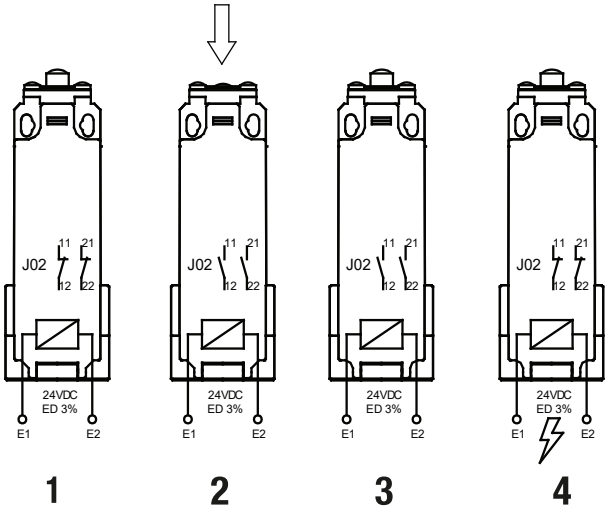
Wiring Diagrams

AHP2R002J02-024



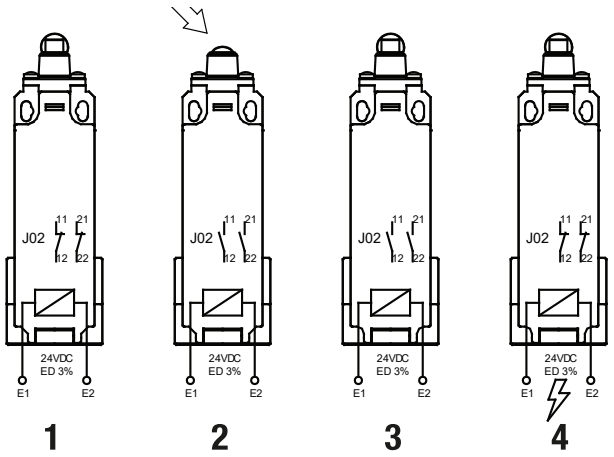
- 1. Limit switch not actuated
- 2. Activation
- 3. Limit switch actuated
- 4. Reset by solenoid or manual

AHP2T11J02-024



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

AHP2T12J02-024

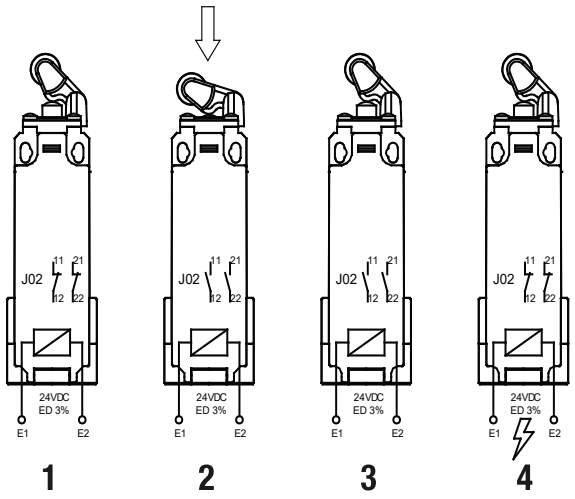


- 1. Limit switch not actuated
- 2. Activation
- 3. Limit switch actuated
- 4. Reset by solenoid

IEC Limit Switches With Remote Reset 24VDC

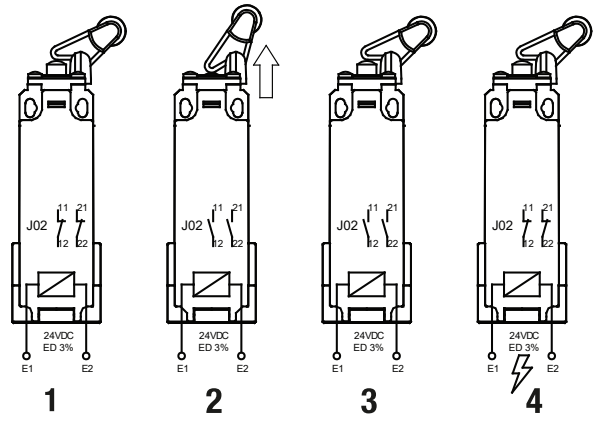
Wiring Diagrams

AHP2T30J02-024



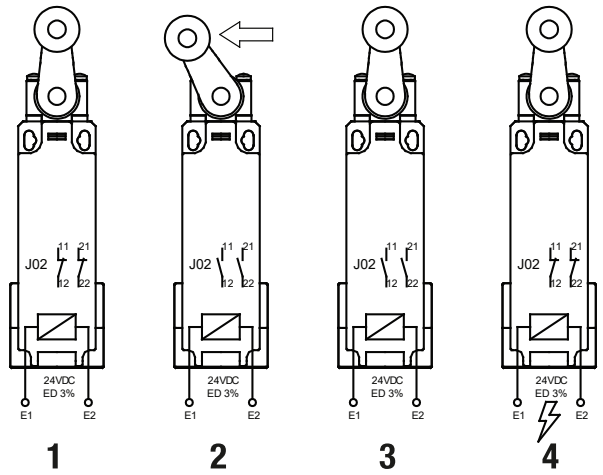
- 1. Limit switch not actuated
- 2. Activation
- 3. Limit switch actuated
- 4. Reset by solenoid

AHP2T32J02-024



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

AHP2T41J02-024

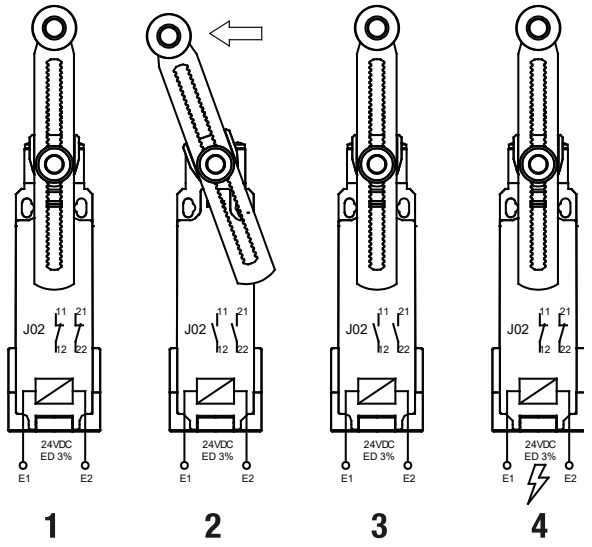


- 1. Limit switch not actuated
- 2. Activation
- 3. Limit switch actuated
- 4. Reset by solenoid

IEC Limit Switches With Remote Reset 24V

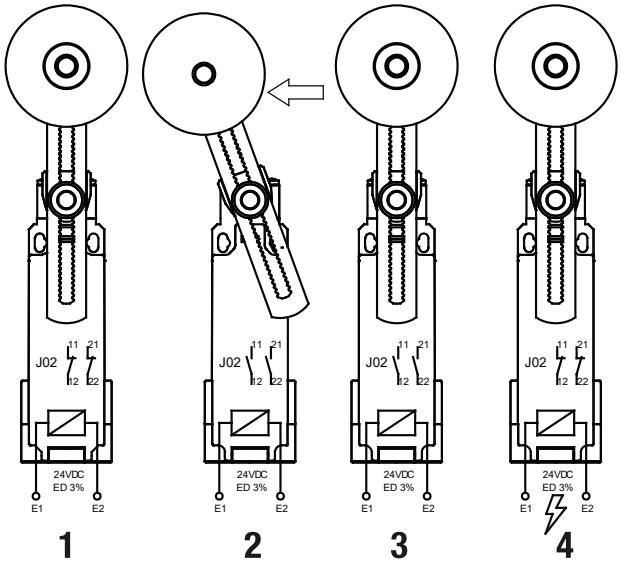
Wiring Diagrams

AHP2T5100J02-024



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

AHP2T5200J02-024



- 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 With Remote Reset 24V Specifications		
Environmental		
Degree of Protection		IP65
Temperature Range		Storage: -30 to 80°C [-22 to 176°F] Operating: -25 to 70°C [-13 to 158°F]
Rated Impulse Withstand Voltage		6kV (degree of pollution 3)
Mechanical Ratings		
Working Positions		90-degree adjustable head
Mechanical Life		50,000 0perations
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		25mΩ
Rated Insulation Voltage	***according to IEC 60947-1 and EN 60947-1***	400V
	according to UL508 and CSA C22-2n° 14	A300 - Q300
Terminal Markings		According to IEC 60947-5-1
Wiring Connections		18-14 AWG [0.75 to 2.5 mm²]
Connection Type		(2) PG11 and (1) 1/2in NPT cable entries
Torque Requirements	***Head***	0.5 to 0.8 N•m [4.42 to 7.08 in-lb]
	Switch and Solenoid	0.8 to 0.9 N•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

***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.**

AchieVe™ Compact Limit Switches

Metal Plunger Actuator AEM Series

- Die-cast metal housings
- 9.8 ft [3m] cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25mm [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.

Compact Limit Switches AEM Series 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
AEM2G11Z11-3	$;086,:	PDF	Metal plunger	0.5 ms	15N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	A
AEM2G11X11-3	$086?:	PDF						Diagram 2		
AEM2G1101Z11-3R	$;-1i,2:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G1101Z11M	$;-1i,u:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G1101Z11MR	$-1j0e:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G1101Z22-3	$;5[oh:	PDF					(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	B
AEM2G16Z11-3	$0871:	PDF	Metal plunger with dust cap	0.5 ms	15N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	C
AEM2G16X11-3	$0870:	PDF						Diagram 2		
AEM2G1601Z11-3R	$;-1i,7:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G1601Z11M	$;;-1i,]:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G1601Z11MR	$--1j0j:	PDF							5-Pin M12 quick-disconnect (right exit)	
AEM2G1601Z22-3	$;-5[oj:	PDF					(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	D
AEM2G18Z11-3	$;-1i,1:	PDF	Metal plunger with bevel cut	0.5 ms	15N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	E
AEM2G21Z11-3	$0873:	PDF	Metal plunger with fixing nuts	0.5 ms	15N	30N		Diagram 1	9.8 ft [3m] cable (bottom exit)	F
AEM2G21X11-3	$0872:	PDF						Diagram 2		
AEM2G2101Z11-3R	$;-1i,a:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G2101Z11M	$;-1i,#:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G2101Z11MR	$-1j0n:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G2101Z22-3	$;5[ok:	PDF					(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	G

Achieve™ Compact Limit Switches

Metal Plunger Actuator AEM Series

A

B

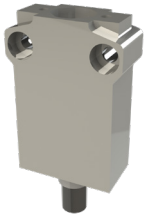
C

D

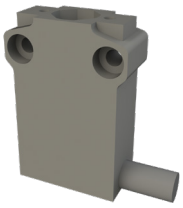
E

F

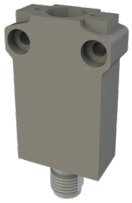
G



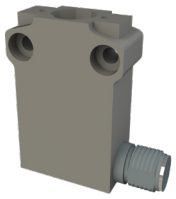
Cable Out (bottom)



Cable Out (right)



5-pin M12 quick-disconnect (bottom exit)



5-pin M12 quick-disconnect (right exit)

AchieVe™ Compact Limit Switches

Metal Plunger with Roller Actuator AEM Series

- Die-cast metal housings
- 9.8 ft [3m] cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25mm [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

Compact Limit Switches AEM Series Selection Chart

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Force	Min. Actuation Force	Min. Positive Opening Force	Number of Contacts	Contact Configuration	Connection Type	Photo
AEM2G12Z11-3	$0875:	PDF	Metal plunger with metal roller	0.1 ms	10N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	A
AEM2G12X11-3	$0874:	PDF						Diagram 2		
AEM2G1201Z11-3R	$;-1i,3:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G1201Z11M	$;-1i,v:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G1201Z11MR	$;-1j0f:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G1201Z22-3	$;-5[oi:	PDF					(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	B
AEM2G13Z11-3	$0877:	PDF	Metal plunger with nylon roller	0.1 ms	10N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	C
AEM2G13X11-3	$0876:	PDF						Diagram 2		
AEM2G1301Z11-3R	$;-1i,4:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G1301Z11M	$;-1i,x:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G1301Z11MR	$-1j0g:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G14Z11-3	$0879:	PDF	Metal plunger with metal cross roller	0.1 ms	10N	30N		Diagram 1	9.8 ft [3m] cable (bottom exit)	D
AEM2G14X11-3	$0878:	PDF						Diagram 2		
AEM2G1401Z11-3R	$;-1i,5:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G1401Z11M	$;-1i,y:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G1401Z11MR	$-1j0h:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G15Z11-3	$087b:	PDF	Metal plunger with nylon cross roller	0.1 ms	10N	30N		Diagram 1	9.8 ft [3m] cable (bottom exit)	E
AEM2G15X11-3	$087a:	PDF						Diagram 2		
AEM2G1501Z11-3R	$;-1i,6:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G1501Z11M	$;-1i,z:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G1501Z11MR	$--1j0i:	PDF							5-pin M12 quick-disconnect (right exit)	

Achieve™ Compact Limit Switches

Metal Plunger with Roller Actuator AEM Series

(Continued)

Compact Limit Switches AEM Series 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
AEM2G17Z11-3	$;-1i,0:	PDF	Metal plunger with metal roller and dust cap	0.1 ms	10N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	F
AEM2G1701Z11-3R	$;-1i,8:	PDF							9.8 ft [3m] cable (right exit)	
AEM2G1701Z11M	$;;-1i,[:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G1701Z11MR	$-1j0k:	PDF							5-pin M12 quick- disconnect (right exit)	
AEM2G22Z11-3	$087d:	PDF	Metal plunger with metal roller and fixing nuts	0.1 ms	10N	30N		Diagram 1	9.8 ft [3m] cable (bottom exit)	G
AEM2G22X11-3	$087c:	PDF						Diagram 2		
AEM2G2201Z11-3R	$;-1i,b:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G2201Z11M	$;;-1i,!:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G2201Z11MR	$-1j0o:	PDF							5-pin M12 quick- disconnect (right exit)	
AEM2G2201Z22-3	$;-5[ol:	PDF		0.5 ms			(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	H
AEM2G2301Z11-3R	$;-1i,c:	PDF	Metal plunger with nylon roller and fixing nuts	0.1 ms	10N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (right exit)	I
AEM2G24Z11-3	$087h:	PDF	Metal plunger with metal cross roller and fixing nuts	0.1 ms	10N	30N		Diagram 1	9.8 ft [3m] cable (bottom exit)	J
AEM2G25Z11-3	$-087j:	PDF	Metal plunger with nylon cross roller and fixing nuts	0.1 ms	10N	30		Diagram 1	9.8 ft [3m] cable (bottom exit)	K

AchieVe™ Compact Limit Switches

Metal Plunger with Roller Actuator AEM Series

(Continued)

A

B

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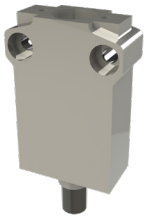
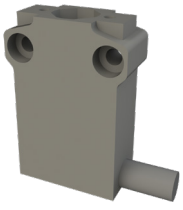
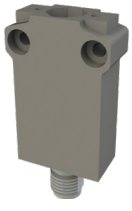


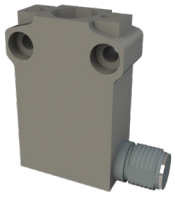
Cable Out (bottom exit)



Cable Out (right exit)



5-pin M12 quick-disconnect (bottom exit)



5-pin M12 quick-disconnect (right exit)

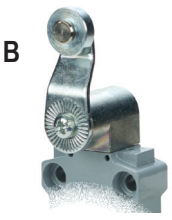
AchieVe™ Compact Limit Switches

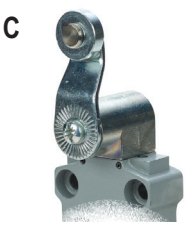
Lever with Roller Actuator AEM Series

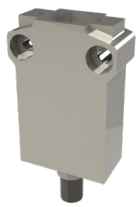
- Die-cast metal housings
- 9.8 ft [3m] cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25mm [0.98 in] hole spacing
- Wide offering of head actuators
- Epoxy resin-filled for IP67 rating
- Snap action (Z11) and (Z22), slow make/slow break (X11), contacts available
- N.C.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

Compact Limit Switches AEM Series Selection Chart

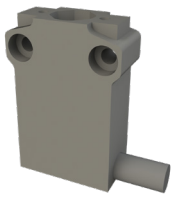
Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed	Min. Actuation Force	Min. Positive Opening Force	Number of Contacts	Contact Configuration	Connection Type	Photo
AEM2G41Z11-3	$08ax:	PDF	Side rotary lever with 14mm nylon roller	1.5 ms	0.08 N•m	0.28 N•m	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	A
AEM2G41X11-3	$08av:	PDF						Diagram 2		
AEM2G4120Z11-3R	$;;-1i,f:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G4120Z11M	$-1j01:	PDF							5-pin M12 quick- disconnect (bottom exit)	
AEM2G4120Z11MR	$;-1j0t:	PDF							5-pin M12 quick- disconnect (right exit)	
AEM2G4120Z22-3	$;5[on:	PDF					(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	
AEM2G42Z11-3	$08az:	PDF	Side rotary lever with 14mm metal roller	1.5 ms	0.08 N•m	0.28 N•m		Diagram 1	9.8 ft [3m] cable (bottom exit)	B
AEM2G42X11-3	$08ay:	PDF						Diagram 2		
AEM2G4220Z11-3R	$;-1i,g:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G4220Z11M	$-1j02:	PDF							5-pin M12 quick- disconnect (bottom exit)	
AEM2G4220Z11MR	$-1j0u:	PDF							5-pin M12 quick- disconnect (right exit)	
AEM2G43Z11-3	$;08a[:	PDF	Side rotary lever with 14mm ball bearing roller	1.5 ms	0.08 N•m	0.28 N•m	(1) N.O./(1) N.C..	Diagram 1	9.8 ft [3m] cable (bottom exit)	C
AEM2G43X11-3	$;08a]:	PDF						Diagram 2		
AEM2G4320Z11-3R	$;-1i,h:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G4320Z11M	$-1j03:	PDF							5-pin M12 quick- disconnect (bottom exit)	
AEM2G4320Z11MR	$-1j0v:	PDF							5-pin M12 quick- disconnect (right exit)	
AEM2G45Z11-3	$08a#:	PDF	Side rotary lever with 18mm nylon roller	1.5 ms	0.08 N•m	0.28 N•m		Diagram 1	9.8 ft [3m] cable (bottom exit)	D
AEM2G45X11-3	$08a_:	PDF						Diagram 2		
AEM2G4520Z11-3R	$;--1i,i:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G4520Z11M	$-1j04:	PDF							5-pin M12 quick- disconnect (bottom exit)	
AEM2G4520Z11MR	$-1j0x:	PDF							5-pin M12 quick- disconnect (right exit)	



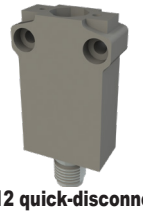




Cable Out (bottom exit)



Cable Out (right exit)



5-pin M12 quick-disconnect (bottom exit)

5-pin M12 quick-disconnect (right exit)

Achieve™ Compact Limit Switches

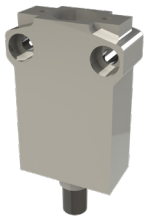
Adjustable Lever with Roller Actuator AEM Series

- Die-cast metal housings
- 9.8 ft [3m] cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25mm [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.

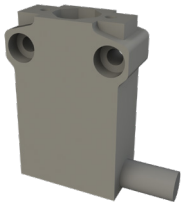
Compact Limit Switches AEM Series Selection Chart

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
AEM2G51Z11-3	$-08ai:	PDF	Side rotary adjustable lever with 18mm nylon roller	1.5 ms	0.08 N•m	0.28 N•m	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	A
AEM2G51X11-3	$08ah:	PDF						Diagram 2		
AEM2G5120Z11-3R	$;--1i,j:	PDF						Diagram 1	9.8 ft [3m] cable (right exit)	
AEM2G5120Z11M	$-1j05:	PDF							5-pin M12 quick-disconnect (bottom exit)	
AEM2G5120Z11MR	$-1j0y:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G5120Z22-3	$;5[oo:	PDF					(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	

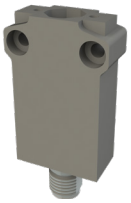
A



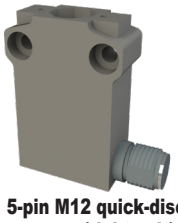
Cable Out (bottom exit)



Cable Out (right exit)



5-pin M12 quick-disconnect (bottom exit)



5-pin M12 quick-disconnect (right exit)

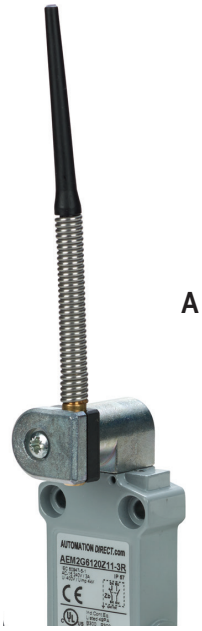
Compact Limit Switches

Adjustable Lever with SS Nylon Tip AEM2G Series

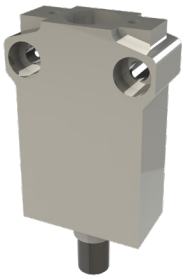
- Die-cast metal housings
- 3m cable/5-pin M12 quick-disconnect (center and right)
- (1) N.O./(1) N.C. contact on all units
- Compact size with standard 25mm hole spacing
- Epoxy resin-filled for IP67 rating
- Both snap action (Z11) and slow make/slow break (X11) contacts available

Compact Limit Switches AEM2G Series Selection Chart

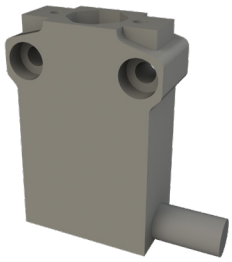
Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed (m/s)	Min. Actuation Force (N) Torque (N•m)	Min. Positive Opening Force (N) Torque (N•m)	Contact Configuration	Connection Type	Photo
AEM2G61Z11-3	$08a?:	PDF	Side rotary lever with nylon tipped stainless steel spring	1.5	0.08	0.28	Diagram 1	Cable Out (bottom)	A
AEM2G61X11-3	$;08a!:	PDF					Diagram 2		
AEM2G6120Z11-3R	$;-1i,k:	PDF					Diagram 1	Cable Out (right)	
AEM2G6120Z11M	$-1j06:	PDF						5-pin M12 quick-disconnect (bottom)	
AEM2G6120Z11MR	$-1j0z:	PDF						5-pin M12 quick-disconnect (right)	



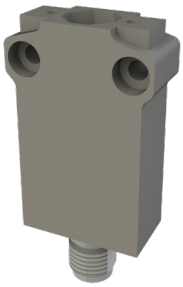
A



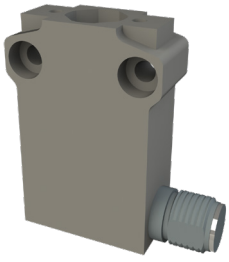
Cable Out (bottom)



Cable Out (right)



5-pin M12 quick-disconnect (bottom)



5-pin M12 quick-disconnect (right)

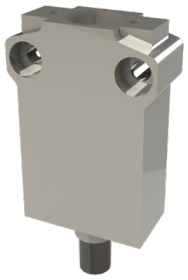
Compact Limit Switches

Adjustable Rod Actuator AEM2G Series

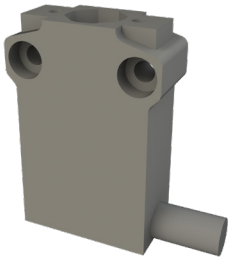
- Die-cast metal housings
- 3m cable/5-pin M12 quick-disconnect (center and right)
- (1) N.O./(1) N.C. contact on all units
- Compact size with standard 25mm hole spacing
- Wide offering of head actuators
- Epoxy resin-filled for IP67 rating
- Both snap action (Z11) and slow make/slow break (X11) contacts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

Compact Limit Switches AEM2G Series Selection Chart

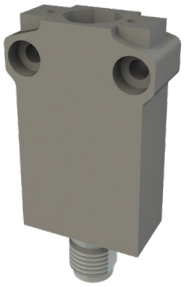
Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed (m/s)	Min. Actuation Force (N) Torque (N•m)	Min. Positive Opening Force (N) Torque (N•m)	Contact Config. Diagram	Connection Type	Photo
AEM2G71Z11-3	$08ak:	PDF	Side rotary adjustable 3mm stainless steel rod	1.5	0.08	0.28	Diagram 1	Cable Out (bottom)	A
AEM2G71X11-3	$-08aj:	PDF					Diagram 2		
AEM2G7120Z11-3R	$;--1i,l:	PDF					Diagram 1	Cable Out (right)	
AEM2G7120Z11M	$-1j07:	PDF						5-pin M12 quick-disconnect (bottom)	
AEM2G7120Z11MR	$;-1j0]:	PDF						5-pin M12 quick-disconnect (right)	
AEM2G73Z11-3	$08ap:	PDF	Side rotary adjustable 6mm nylon rod	1.5	0.08	0.28	Diagram 1	Cable Out (bottom)	B
AEM2G73X11-3	$08ao:	PDF					Diagram 2		
AEM2G7320Z11-3R	$;-1i,o:	PDF					Diagram 1	Cable Out (right)	
AEM2G7320Z11M	$-1j09:	PDF						5-pin M12 quick-disconnect (bottom)	
AEM2G7320Z11MR	$-1j0_:	PDF						5-pin M12 quick-disconnect (right)	
AEM2G74Z11-3	$08as:	PDF	Side rotary adjustable 6mm fiberglass rod	1.5	0.08	0.28	Diagram 1	Cable Out (bottom)	C
AEM2G75Z11-3	$08au:	PDF	Side rotary adjustable 3mm square steel shaft	1.5	0.08	0.28	Diagram 1	Cable Out (bottom)	D



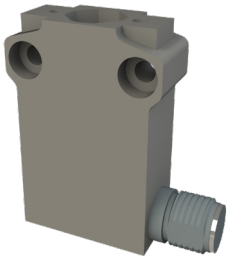
Cable Out (bottom)



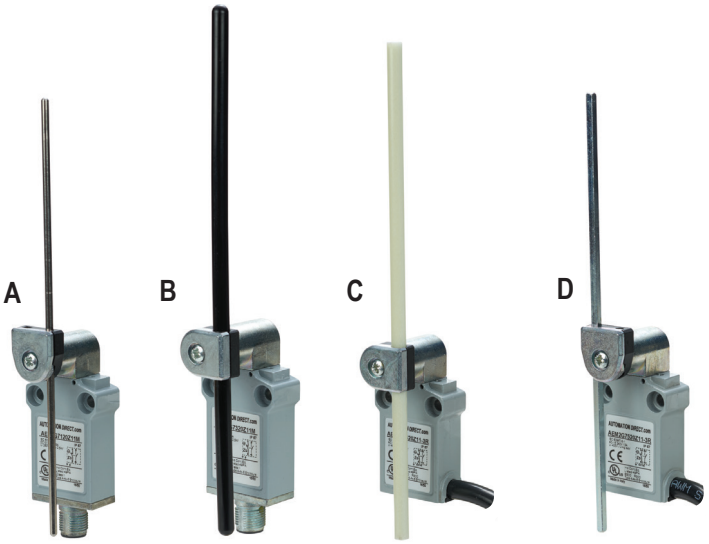
Cable Out (right)



5-pin M12 quick-disconnect (bottom)



5-pin M12 quick-disconnect (right)



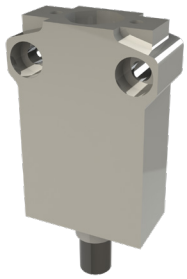
Achieve™ Compact Limit Switches

360 Degree Spring Actuator AEM2G Series

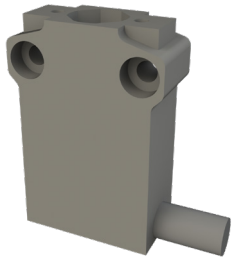
- Die-cast metal housings
- 9.8 ft [3m] cable/5-pin M12 quick-disconnect (bottom and right)
- Compact size with standard 25mm [0.98 in] hole spacing
- Epoxy resin-filled for IP67 rating
- Snap-action (Z11) and (Z22), slow-make/slow-break (X11), contacts available

Compact Limit Switches AEM2G Series Selection Chart

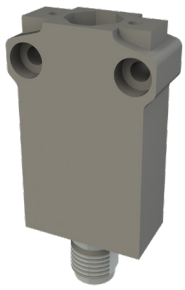
Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed	Min. Actuation Force	Min. Positive Opening Force	Number of Contacts	Contact Configuration	Connection Type	Photo
AEM2G92Z11-3	$086#:	PDF	360 degree stainless steel spring with nylon tip	0.1 ms	10N	30N	(1) N.O./(1) N.C.	Diagram 1	9.8 ft [3m] cable (bottom exit)	A
AEM2G9201Z11-3R	$;-1i,s:	PDF							9.8 ft [3m] cable (right exit)	
AEM2G9201Z11M	$-1j0c:	PDF							5-pin M12 quick- disconnect (bottom exit)	
AEM2G9201Z11MR	$-1j0?:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G93Z11-3	$;086!:	PDF	360 degree stainless steel spring	1.0 ms	0.10 N•m	—		Diagram 1	9.8 ft [3m] cable (bottom exit)	B
AEM2G9301Z11-3R	$;;-1i,t:	PDF							9.8 ft [3m] cable (right exit)	
AEM2G9301Z11M	$-1j0d:	PDF							5-pin M12 quick- disconnect (bottom exit)	
AEM2G9301Z11MR	$;-1j0,:	PDF							5-pin M12 quick-disconnect (right exit)	
AEM2G9301Z22-3	$;5[op:	PDF					(2) N.O./(2) N.C.	Diagram 3	9.8 ft [3m] cable (bottom exit)	



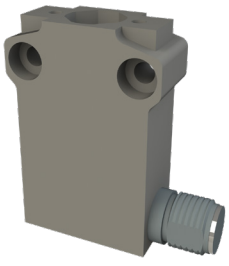
Cable Out (bottom exit)



Cable Out (right exit)



5-pin M12 quick-disconnect (bottom exit)



5-pin M12 quick-disconnect (right exit)

A

B

Compact Limit Switches Specifications

Compact Limit Switches Specifications AEM Series			
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°C (-40 to 158°F). Operating: -25 to 70°C [-13 to 158°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	4A @ <500VAC Part number AEM2G9301Z22-3 is 10A @ <500VAC
Contact Resistance		25mΩ	
Recommended Min Operating Speed		With snap-action contacts: 20mm per minute With slow-action contacts: 500mm per minute	
Rated Insulation Voltage		B300, R300 according to UL508; 400V (degree of pollution: 3) according to IEC 60947-1	C300 - R300 according to UL508, 250V (degree of pollution 3)
Connection Type		Cable: 3m [9.8 ft] PVC cable, 5 x 0.75 mm^2 (18AWG). Overall cable diameter: 8.20 mm (0.32 in) Connector: 5-pin M12 quick-disconnect	Pigtail 3m [9.8 ft], PVC, 0.5 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 N•m [0.8 N•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.**

AchieVe™ 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

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

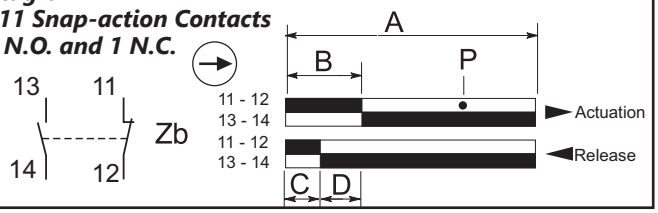


Diagram 2
X11 Snap-action Contacts
1 N.O. and 1 N.C.

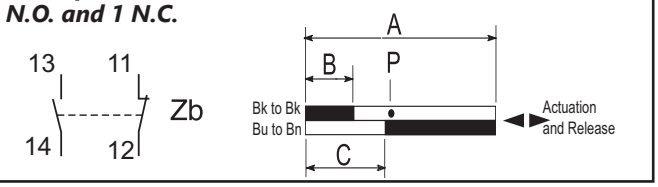
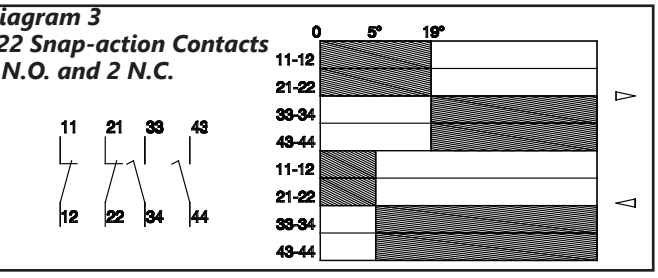


Diagram 3
Z22 Snap-action Contacts
2 N.O. and 2 N.C.



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

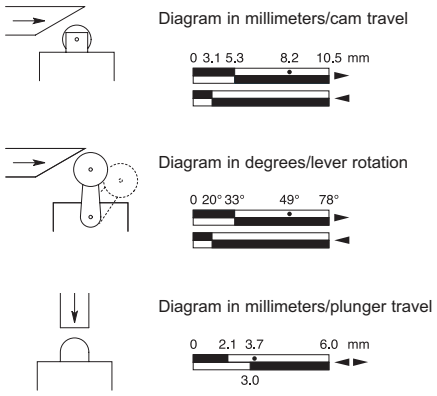
B = Tripping travel of the N.C. contact

C = Tripping travel of the N.O. contact

D = Differential travel (between actuation and release)

P = Point from which positive opening is assured during actuation

Bar Chart Examples
(cam angle is 30 degrees)

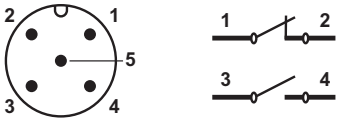


Note: Values represent travel of cam in direction of arrow.

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°	32°	21°	65°
AEM2G41, AEM2G42, AEM2G43, AEM2G45, AEM2G51, AEM2G71, AEM2G72, AEM2G73, AEM2G74, AEM2G75	X11	74°	28°	48°	50°
AEM2G41, AEM2G51	Z22	75°	30°	10°	55°
AEM2G61	Z11	74°	32°	21°	Not positive-opening
AEM2G61	X11	74°	28°	48°	
AEM2G92	Z11	—	20°	10°	
AEM2G93	Z11	—	20°	10°	
AEM2G93	Z22	—	19°	5°	—

5-Pin M12 connector



Note: Green/yellow wire is physical earth ground.

= Contact open

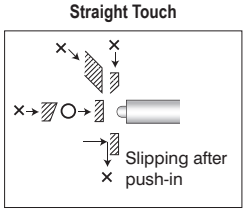
= Contact closed

METROL Precision Limit Switches

Precision Touch Limit Switches

Features

- Slim design (from M5) allows side-by-side installation
- Long-stroke and water-resistant models available
- 5 micron (µm) 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.

CSJ055A-L

CS067A-CL

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
Straight Touch									
CSJ055A	$6boh:	PDF	Ø 2mm plunger, SR 1.5 mm	Threaded	M5×0.5	2.8mm	(1) N.O.	1N	Cable, 3m [9.8ft]
CSJ055A-L	$1n7?:	PDF	Ø 2mm plunger, SR 1.5mm			2.8mm	(1) N.O.	1N	
CSJS50A	$6bog:	PDF	Ø 2mm plunger SR 1.5mm	Smooth	Ø 5mm	2.8mm	(1) N.O.	1N	
CSJS50A-L	$;1n7,:	PDF	Ø 2mm plunger, SR 1.5mm		Ø 5mm	2.8mm	(1) N.O.	1N	
CS065A-L	$1n80:	PDF	Ø 2mm plunger, SR 1.5mm	Threaded	M6×0.5	2.8mm	(1) N.O.	1N	
CSS60A-L	$1n81:	PDF	Ø 2mm plunger, SR 1.5mm	Smooth	Ø 6mm	2.8mm	(1) N.O.	1N	
CSS60B-L	$1n82:	PDF	Ø 2mm plunger, SR 1.5mm			2.8mm	(1) N.C.	1N	
CS067A	$-6boj:	PDF	Ø 2mm plunger, SR 1.5mm	Threaded	M6×0.75	2.8mm	(1) N.O.	1N	
CS067A-B	$-6boi:	PDF	Ø 2mm plunger, Ø 4mm flat			2.8mm	(1) N.O.	1N	
CS067A-L	$1n83:	PDF	Ø 2mm plunger, SR 1.5mm			2.8mm	(1) N.O.	1N	
CS067B	$6bok:	PDF	Ø 2mm plunger, SR 1.5mm			2.8mm	(1) N.C.	1N	
CS067B-L	$1n85:	PDF	Ø 2mm plunger, SR 1.5mm			2.8mm	(1) N.C.	1N	
CS067A-BL	$1n84:	PDF	Ø 2mm plunger, Ø 4mm flat			2.8mm	(1) N.O.	1N	
CSS80A-L	$1n86:	PDF	Ø 3.5mm plunger, SR 3mm	Smooth	Ø 8mm	2.8mm	(1) N.O.	1N	
CS087A-L	$1n87:	PDF	Ø 3.5mm plunger, SR 3mm	Threaded	M8×0.75	2.8mm	(1) N.O.	1N	
CSK087A	$;6bof:	PDF	Ø 3.5mm plunger, SR 3mm			5mm	(1) N.O.	1N	
CSK087A-L	$1n88:	PDF	Ø3.5mm plunger, SR 3mm			5mm	(1) N.O.	1N	
CSK087B-L	$1n89:	PDF	Ø 3.5mm plunger, SR 5mm			5mm	(1) N.C.	1N	
CSP087A-AL	$1n8a:	PDF	Ø 5.5mm plunger, 2mm round			2.8mm	(1) N.O.	1N	
CSP087B-AL	$1n8b:	PDF	Ø 5.5mm plunger, 2mm round			2.8mm	(1) N.C.	1N	
Straight Needle Contact Touch									
CSJ055A-CL	$2bvo:	PDF	needle plunger, 1.5mm flat	Threaded	M5×0.5	2.8mm	(1) N.O.	1N	Cable, 3m [9.8ft]
CS065A-CL	$2bvp:	PDF	needle plunger, 1.5mm flat		M6×0.5	2.8mm	(1) N.O.	1N	
CS067A-CL	$2bvq:	PDF	needle plunger, 1.5mm flat		M6×0.75	2.8mm	(1) N.O.	1N	
Spring Plunger									
SP080A-L	$6box:	PDF	Ø 2.5mm plunger SR 1.25mm	Threaded	M8×1.25 mm	3mm	(1) N.O.	8N	Cable 2m [6.56ft]

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

METROL Precision Limit Switches


CSJ055A


CSJ055A-L


CSJS50A


CSJS50A-L


CS065A-L


CSS60A-L


CSS60B-L


CS067A


CS067A-B


CS067A-L


CS067B


CS067B-L


CS067A-BL


CSS80A-L


CS087A-L


CSK087A


CSK087A-L


CSP087A-AL


CSJ055A-CL


CS065A-CL


CS067A-CL


SP080A-L

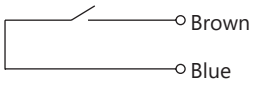
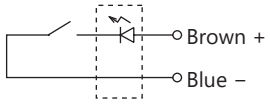
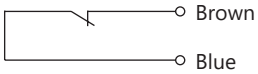
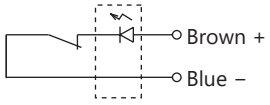
METROL

Precision Limit Switches

Precision Touch Limit Switches Specifications						
Type	***Straight Touch Switches***					
Series	***CS***	***CSJ***	***CSS***	***CSK***	***CSP***	***SP***
Environmental						
Degree of Protection	IP65				IP67	IP40
Temperature Range	Operating: 0 to 80°C [32 to176°F] (Ice-free)					
Mechanical Ratings						
Enclosure Material	Stainless Steel					
Pretravel	0.3 mm					2.2 mm
Torque (for nuts on threaded barrels, set screws on smooth barrels)	4 N•m	2 N•m	N/A	N/A	7 N•m	L1 10N•m L2 5•Nm
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction					
Shock	300 m/s² for X, Y, Z each direction					
Repeat Accuracy	5 micron (µm) *					Both On-Off, Off-On 0.01mm (range)
Recommended Minimum Operating Speed	50mm (1.96 in)/minute					
Electrical Ratings						
Contact Life	10 million operations					3 million (spring)
Contact Voltage	5–24VDC					
Steady Current Rating	10mA or less					
Max In-rush Current Rating	20mA without LED indicator, 10mA with LED indicator					
Connection Type	Cable: 3m (2m for SP series) Oil resistant Ø2.8/ 2 cores, Tensile strength 30N, minimum bending R7					
Indicating	-L models: LED indicator (mounted in cable 120mm from the switch)					

*** At operating speed 50-200 mm/minute. Operating speed slower than 10 mm/min is not recommended.**

Circuit Diagrams

Without LED	***With LED (-L models)***
Normally open (N.O.)  	Normally open (N.O.)  LED Normally Off
Normally closed (N.C.)  	Normally closed (N.C.)  LED Normally On

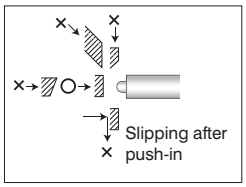
METROL

Precision Limit Switches

Precision Straight Touch Limit Switches

Features

- Ultra-small design (M5 or Ø5)
- 3 micron (µm) repeat accuracy
- No movement differential
- Dustproof / water-resistant (IP67) models available
- Stainless steel housing
- Metal bearing

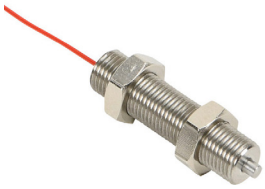


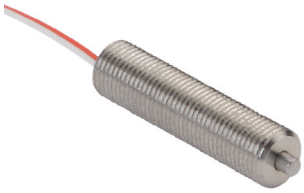
O indicates correct target approach and orientation.
X indicates approach and orientation that should be avoided.

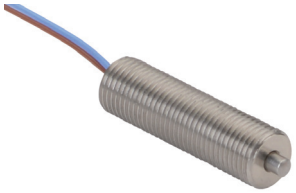
Precision Straight Touch Limit Switches Selection Chart

Part Number	Price	Drawing Link	Actuator/Head Type*	Barrel	Barrel Diameter/ Thread*	Stroke	Switching Output	Contact Force	Connection Type
PT5M1WA	$6bov:	PDF	Ø 1.5mm plunger, SR 2mm	Threaded	M5×0.5	1.5mm	(1) N.O.	0.5N	Core wire, 0.5m [1.6ft]
PT5M3WA	$1n8h:	PDF	Ø 1.5mm plunger, SR 2mm			1.5mm	(1) N.O.	0.5N	
PT5M3WB	$1n8e:	PDF	Ø 1.5mm plunger, SR 2mm			1.5mm	(1) N.C.	0.5N	
PT5M3CB	$;6bot:	PDF	Ø1.5mm plunger, SR 2mm			1.5mm	(1) N.C.	0.5N	Cable, 2m [6.5ft]
PT5M3CB-L	$;1n8f:	PDF	Ø 1.5mm plunger, SR 2mm			1.5mm	(1) N.C.	0.5N	
PT5S3CB-L	$1n8g:	PDF	Ø 1.5mm plunger, SR 2mm	Smooth	Ø 5 mm	1.5mm	(1) N.C.	0.5N	
PTP5M3CB-B	$06bou:	PDF	Ø 1.5mm plunger, Ø 3mm flat	Threaded	M5×0.5	1.5mm	(1) N.C.	0.8N	
PTP5M3CB-L	$-1n8i:	PDF	Ø 11.5mm plunger, SR 2mm	Threaded		1.5mm	(1) N.C.	0.8N	
PTP5S3CB-L	$-1n8j:	PDF	Ø 1.5mm plunger, SR 2mm	Smooth	Ø 5 mm	1.5mm	(1) N.C.	0.8N	

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


PT5M1WA


PT5M3WA


PT5M3WB


PT5M3CB


PTP5M3CB-L


PTP5S3CB-L


PTP5M3CB-B


PTP5M3CB-L

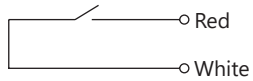
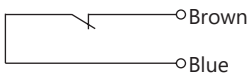
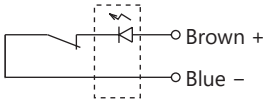

PTP5S3CB-L

METROL Precision Limit Switches

Precision Straight Touch Limit Switches Specifications		
Series	***PT5x3xx***	***PTP5x3CB***
Environmental		
Degree of Protection	IP40	IP67
Temperature Range	Operating: 0 to 80°C [32 to 176°F] (Ice-free)	
Mechanical Ratings		
Enclosure Material	303 Stainless Steel	
Pretravel	0* (PT5M3WA and PT5M1WA about 0.3 mm)	
Torque (for nuts on threaded barrels, set screws on smooth barrels)	1 N·m	
Vibration	10–55 Hz total amplitude 1.5 for X, Y, Z each direction	
Shock	300 m/s² for X, Y, Z each direction	
Electrical Ratings		
Contact Life	3 million operations	
Repeat Accuracy	Both On–Off, Off–On: 0.003 mm**	
Recommended Minimum Operating Speed	50 mm/minute	
Contact Voltage	5–24 VDC	
Steady Current Rating	10mA or less	
Max In-rush Current Rating	20mA without LED indicator, 10mA with LED indicator	
Connection Type	PTxxxWx: Core-wire cable, 0.5m (×2) Oil resistant Ø 0.6 Tensile strength 15N. PTxxxCB: Cable, 2m Oil-resistant Ø2.8/2 cores Tensile strength 30N, Minimum bending R7.	
Indicating	-L models: LED indicator (mounted in cable 120mm from the switch)	

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

Circuit Diagrams

Without LED	*With LED (-L models)*
Normally open (N.O.)  	
Normally closed (N.C.)  	Normally closed (N.C.)  LED Normally On

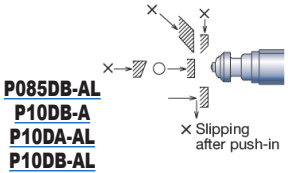
METROL

Precision Limit Switches

High Precision Touch Limit Switches

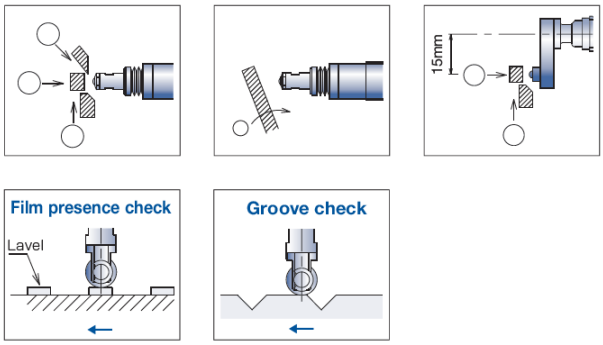
Features

- 0.5 micron (µm) repeat accuracy
- No movement differential
- No temperature drift
- Dustproof / water-resistant (IP67)
- LED indicator
- Stainless steel housing



P085DB-AL
P10DB-A
P10DA-AL
P10DB-AL
P10DLB-AL

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 Limit 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	$01n8k:	PDF	Ø 5.5mm plunger, 2mm round	Threaded	M8×0.5	3mm	(1) N.C.	1N	Cable 3m [9.8ft]
P10DB-A	$06bos:	PDF	Ø8.5mm plunger, 2mm round	Threaded	M10×0.5	3mm	(1) N.C.	1N	
P10DB-AL	$-01n8l:	PDF	Ø 8.5mm plunger, 2mm round	Threaded	M10×0.5	3mm	(1) N.C.	1N	
P10DA-AL	$01n8n:	PDF	Ø 8.5mm plunger, 2mm round	Threaded	M10×0.5	3mm	(1) N.O.	1N	
P10DLB-AL	$045hz:	PDF	Ø 8.5mm plunger, 2mm round	Threaded	M10×0.5	10mm	(1) N.C.	1N	
Straight Touch With Ball Bearing									
P10DHA-TML	$;045h]:	PDF	Ø 2.5mm plunger, 8mm roller	Threaded	M14×0.5	3mm	(1) N.O.	1N	Cable 3m [9.8ft]
P10DHB-TML	$;045h[:	PDF	Ø 2.5mm plunger, 8mm roller	Threaded	M14×0.5	3mm	(1) N.C.	1N	
P10DHLTB-TML	$045h_:	PDF	Ø 2.5mm plunger, 8mm roller	Threaded	M14×0.5	10mm	(1) N.C.	1N	

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

P085DB-AL

P10DB-A

P10DB-AL

P10DA-AL

P10DLB-AL

P10DHA-TML

P10DHB-TML

P10DHLTB-TML

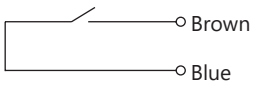
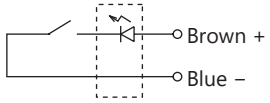
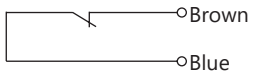
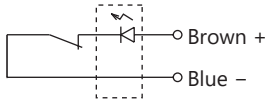
METROL Precision Limit Switches

High Precision Touch Limit Switches

High Precision Touch Limit Switches Specifications				
Series	***P08***	***P10***	***P10DH***	***P10DHL***
Environmental				
Degree of Protection	IP67			
Temperature Range	Operating: 0 to 80°C [32 to 176°F] (Ice-free)			
Mechanical Ratings				
Enclosure Material	303 Stainless Steel			
Pretravel	0*	P10DA / P10DHA: 0.2 mm P10DB / P10DHB: 0*		0*
Torque (for nuts on threaded barrels, set screws on smooth barrels)	4 N•m (2.95 lb•ft)	8 N•m (5.90 lb•ft)	10 N•m (7.38 lb•ft)	
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction			
Shock	300 m/s² for X, Y, Z each direction			
Repeat Accuracy	Both On–Off, Off–On: 0.0005 mm (range)**			
Recommended Minimum Operating Speed	50mm/minute			
Electrical Ratings				
Contact Life	3 million operations			
Contact Voltage	5–24VDC			
Steady Current Rating	10mA or less			
Max In-rush Current Rating	20mA without LED indicator, 10mA with LED indicator			
Connection Type	Cable: 3m Oil resistant Ø5/2 cores (P08: Ø4/2 cores), tensile strength 30N, minimum bending R7, 20AWG			
Indicating	-AL: LED indicator (mounted in cable 120mm from the switch)			

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

Circuit Diagrams

Without LED	*With LED (-AL models)*
Normally open (N.O.)  	Normally open (N.O.)  LED Normally Off
Normally closed (N.C.)  	Normally closed (N.C.)  LED Normally On

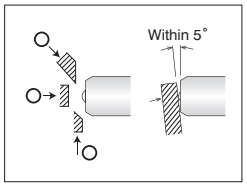
METROL Precision Limit Switches

Ball Plunger Limit Switches

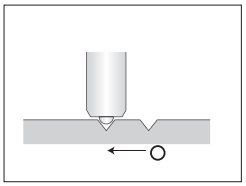
Features

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

Angled/Sliding Touch



Indexing Touch



O indicates correct target approach and orientation.

Ball Plunger Limit Switches Selection Chart

Part Number	Price	Drawing Link	Actuator/Head Type*	Barrel Type	Barrel Diameter/ Thread*	Stroke	Switching Output	Contact Force	Connection Type
Indexing/Angled/Sliding Touch									
BP060A-F	$6boe:	PDF	Ø 3mm ball plunger	Threaded	Ø M6×1.0	0.8mm	(1) N.O.	1N	Cable 2m [6.5 ft]
BP060A-L	$1n8p:	PDF	Ø 3mm ball plunger			0.8mm	(1) N.O.	8-13N	
BP060A-LF	$1n8q:	PDF	Ø 3mm ball plunger			0.8mm	(1) N.O.	1N	
BP080A-L	$2bvs:	PDF	Ø 4mm ball plunger		Ø M8×1.25	1.0mm	(1) N.O.	10-16N	
BP080A-LF	$;2bvt:	PDF	Ø 4mm ball plunger			1.0mm	(1) N.O.	1N	
BP100A-L	$-2bvi:	PDF	Ø 5mm ball plunger		Ø M10×1.5	1.2mm	(1) N.O.	15-20N	
BP100A-LF	$-2bvj:	PDF	Ø 5mm ball plunger			1.2mm	(1) N.O.	1N	
BP4SWA	$1n8s:	PDF	Ø 3mm ball plunger	Smooth	Ø 4mm	0.8mm	(1) N.O.	1N	Core wire 0.5m [1.64 ft]
BP5MWA	$;1n8t:	PDF	Ø 3mm ball plunger	Threaded	M5×0.5	1mm	(1) N.O.	1N	

*** Ø = diameter**

BP060A-F

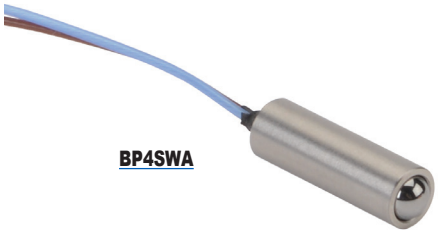
BP060A-L

BP080A-L

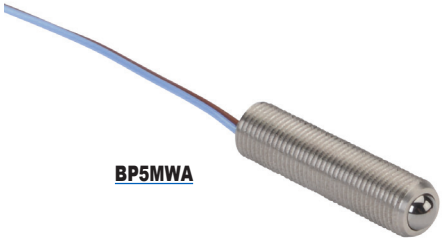
BP080A-LF

BP100A-L

BP100A-LF



BP4SWA



BP5MWA

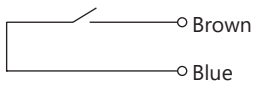
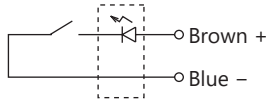
METROL

Precision Limit Switches

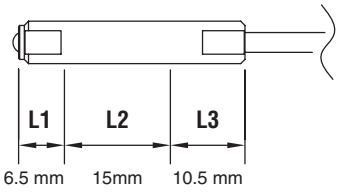
Ball Plunger Limit Switches Specifications					
Series	***BP060A***	***BP080A***	***BP100A***	***BP4SWA***	***BP5MWA***
Environmental					
Degree of Protection	IP40				
Temperature Range	Operating: 0 to 80°C [32 to 176°F] (Ice-free)				
Mechanical Ratings					
Enclosure Material	303 Stainless Steel				
Pretravel	0.3 mm				
Torque (for nuts on threaded barrels, set screws on smooth barrels)	See Torque Limit Figure			NA	1 N•m
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction				
Shock	300 m/s² for X, Y, Z each direction				
Repeat Accuracy	Both On–Off, Off–On: 0.01 mm (range)(axial direction)*				
Recommended Minimum Operating Speed	50mm/minute				
Electrical Ratings					
Contact Life	3 million operations			1 million operations	
Contact Voltage	5–24VDC				
Steady Current Rating	10mA or less				
Max In-rush Current Rating	10mA (limit current to protect LED indicator)			20mA	
Connection Type	Cable: 2m Oil resistant Ø2.8/2 cores, Tensile strength 30N, minimum bending R7.			Core wire cable: 0.5m (×2), Oil resistant, Ø0.66, Tensile strength 15N	
Indicating	-L and -LF models: LED indicator (mounted in cable 120mm from the switch)			N/A	

*** At operating speed 50-200 mm/minute. Operating speed slower than 10 mm/min is not recommended.**

Circuit Diagrams

Without LED	*With LED*
Normally open (N.O.)  	Normally open (N.O.)  LED Normally Off

Torque Limits



Tightening Torque for Case Screws and Nuts						
Applicable Models	***L1***		***L2***		***L3***	
	Length	***Tightening Torque***	***Length***	***Tightening Torque***	***Length***	***Tightening Torque***
BP060A	6.5mm	2.5 N•m [1.84 lb•ft]	15mm	5 N•m [3.68 lb•ft]	10.5mm	2.5 N•m [1.84 lb•ft]
BP080A	8mm	5 N•m [3.68 lb•ft]	21.5mm	10 N•m [7.37 lb•ft]	5.5mm	5 N•m [3.68 lb•ft]
BP100A	6.5mm	15 N•m [11.06 lb•ft]	22.5mm	25 N•m [18.44 lb•ft]	9mm	15 N•m [11.06 lb•ft]

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.

METROL

Precision Limit Switches

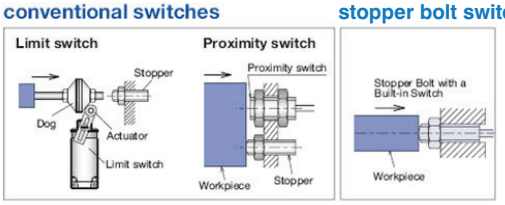
Stopper Bolt Precision Limit Switches

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 high-impact forces required to stop a load.

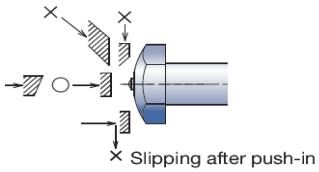
Stopper Bolt Limit Switches can reduce parts count

conventional switches | stopper bolt switch



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 (µm) repeat accuracy
- No movement differential
- Stainless steel housing



O indicates correct target approach and orientation.

X indicates approach and orientation that should be avoided.

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	$;2bv,:	PDF	Ø 5.5mm plunger with upward cover Ø 5mm	Threaded	M10×1.5	0.7mm	(1) N.O.	4N	Cable 2m [6.56 ft]
STP100DA-L	$2bx0:	PDF	Ø 5.5mm plunger with downward cover Ø 5mm	Threaded	M10×1.5	0.7mm	(1) N.O.	4N	
STS060PA	$6boy:	PDF	Ø 1.5mm plunger, 3.4mm flat	Threaded	M6x1.0	0.7mm	(1) N.O.	2N	
STS060PA-L	$45h#:	PDF	Ø 1.5mm plunger, 3.4mm flat	Threaded	M6x1.0	0.7mm	(1) N.O.	2N	
STS080PA-L	$2bx1:	PDF	Ø 1.5mm plunger, 4.5mm flat	Threaded	M8×1.25	0.7mm	(1) N.O.	2N	
STS100PA-L	$2bx2:	PDF	Ø 1.5mm plunger, 4.5mm flat	Threaded	M10×1.5	0.7mm	(1) N.O.	2N	
STE060PA-L	$;45h!:	PDF	Ø 1.5mm plunger, 3.4mm flat with hex	Threaded	M6x1.0	0.7mm	(1) N.O.	2N	
STE080PA-L	$2bx3:	PDF	Ø 1.5mm plunger, 4.5mm flat with hex	Threaded	M8×1.25	0.7mm	(1) N.O.	2N	
STE100PA-L	$2bx4:	PDF	Ø 1.5mm plunger, 4.5mm flat with hex	Threaded	M10×1.5	0.7mm	(1) N.O.	2N	

* Ø = diameter

STP Series (Stopper With Protective Cover)

STP100UA-L

STP100DA-L

STS060PA

STS Series (Straight Stopper Bolt)

STS060PA-L

STS080PA-L

STS100PA-L

STE Series (Hexagonal Stopper Bolt)

STE060PA-L

STE080PA-L

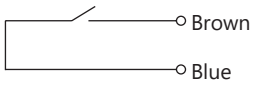
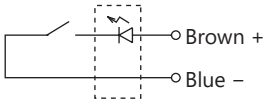
STE100PA-L

METROL Precision Limit Switches

Stopper Bolt Precision Limit Switches Specifications			
Series	***STP***	***STS***	***STE***
Environmental			
Degree of Protection	IP67**	IP65**	
Temperature Range	Operating: 0 to 80°C [32 to 176°F] (Ice-free)		
Mechanical Ratings			
Enclosure Material	Stainless steel		
Torque (for nuts on threaded barrels, set screws on smooth barrels)	See Torque Limit Figure		
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction		
Shock	300 m/s² for X, Y, Z each direction		
Repeat Accuracy	Both On-Off, Off-On/ 0.01 (range) (At operating speed 50-200mm/min) *2		
Recommended Minimum Operating Speed	50mm (1.96in)/minute		
Withstand Load	5000N		
Electrical Ratings			
Contact Life	10 million (No bungle caused by vibration and use under contact rating)		
Impact resistance	0.4J		
Contact Voltage	5–24VDC		
Steady Current Rating	10mA or less		
Max In-rush Current Rating	20mA without LED indicator, 10mA with LED indicator		
Connection Type	Standard length 2m [6.56 ft] oil resistant 2.8 / 2 cores, 26AWG Tensile strength 30N, minimum bending R7		
Indicating	-L models: LED indicator (mounted in cable 120mm from the switch)		

*** At operating speed 50-200 mm/minute. Operating speed slower than 10 mm/min is not recommended.**
**** At normal temperature (0–80°C [32–176°F]).**

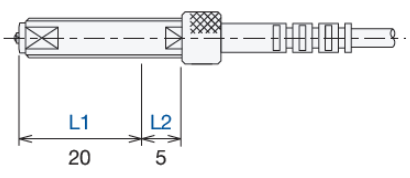
Circuit Diagram

Without LED	*With LED (-L models)*
Normally open (N.O.)  	Normally open (N.O.)  LED Normally Off

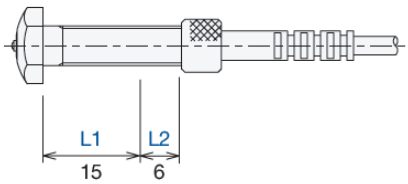
Torque Limits

Applicable models	*Tightening torque*
STS060PA-L	L1: 5 N•m [3.68 lb•ft] L2: 2.5 N•m [1.84 lb•ft]
STE060PA-L	
STS060PA	
STS080PA-L	10 N•m [7.38 lb•ft]
STE080PA-L	10 N•m [7.38 lb•ft]
STS100PA-L	25 N•m [18.44 lb•ft]
STE100PA-L	25 N•m [18.44 lb•ft]
STP100UA-L	25 N•m [18.44 lb•ft]
STP100DA-L	25 N•m [18.44 lb•ft]

STS060PA-L



STE060PA-L



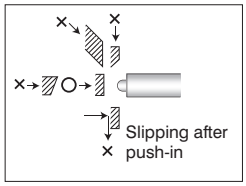
METROL Precision Limit Switches

Low Contact Force Limit Switches: CSFN / CS / CSJ

Features

- 0.1N and 0.5N contact force
- 5 micron (µm) and 10 micron (µm) repeat accuracy
- Stainless steel housing
- Metal bearing
- Straight-touch and straight needle touch available

Low Contact Force Straight Touch

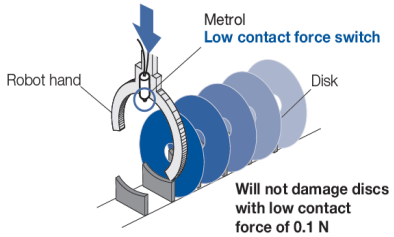


O indicates correct target approach and orientation.

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	$45hy:	PDF	Ø 2mm plunger [0.079 in] SR 1.5 mm [0.059 in]	Threaded	M10x0.5	2mm [0.079in]	NPN, N.O.	0.1N	3m [9.8 ft] cable
Low Contact Force, Straight Touch, Metal Bearing									
CS067A-LG	$45hx:	PDF	Ø 2mm plunger [0.079 in] SR 1.5 mm [0.059 in]	Threaded	M6x0.75	2.8mm [0.110in]	(1) N.O.	0.5N	3m [9.8 ft] cable
Low Contact Force, Straight Touch, Needle Contact									
CSJ055A-CG	$;45ht:	PDF	needle plunger Ø 1.5mm flat [0.059 in]	Threaded	M5x0.5	2.8mm [0.110in]	(1) N.O.	0.5N	3m [9.8 ft] cable

Ø = diameter, SR = surface radius
*** Must be mounted in a downward direction**

CSFN105A-H6X

CS067A-LG

CSJ055A-CG

METROL

Precision Limit Switches

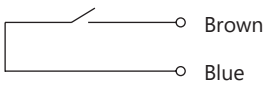
Low Contact Force Limit Switches Specifications			
Series	***CSFN Metal Bearing***	***CS Custom Metal Bearing***	***CSJ Custom Needle Contact***
Environmental			
Degree of Protection	IP40	IP65	
Temperature Range	Operating: 0 to 60°C [32 to 140°F] (Ice-free)	Operating: 0 to 80°C [32 to 176°F] (Ice-free)	
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 N•m [2.95 lb•ft]	2 N•m [1.48 lb•ft]	N/A
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction		
Shock	300 m/s² for X, Y, Z each direction		
Repeat Accuracy	0.01 mm (10 micron [µm]) *	0.005 mm (5 micron [µm]) *	
Recommended Minimum Operating Speed	50mm (1.96in)/minute		
Electrical Ratings			
Contact Life	10 million operations		
Contact Voltage	12–24VDC	5–24VDC	
Steady Current Rating	10mA or less		
Max In-rush Current Rating	10mA (limit current to protect LED indicator)		
Connection Type	Cable: 3m PVC (polyvinyl chloride) oil resistant Ø4/3 cores, 30AWG Tensile strength 30N, minimum bending R7	Cable: 3m PVC (polyvinyl chloride) oil resistant Ø2.8/2 cores, 26AWG Tensile strength 30N minimum bending R7	
Indicating	-L: LED indicator (mounted in cable 120mm from the switch)		

*** At operating speed 50-200 mm/minute. Operating speed slower than 10 mm (0.393 in)/min is not recommended.**

Circuit Diagrams

Without LED

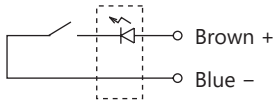
Normally open (N.O.)



Normally closed (N.C.)

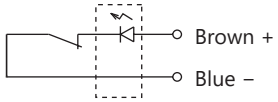
With LED

Normally open (N.O.)



LED Normally Off

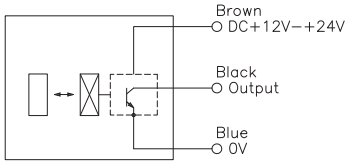
Normally closed (N.C.)



LED Normally On

CSFN105A-H6X

Normally open (N.O.)
(NPN Open Collector)



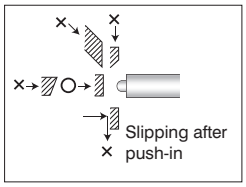
METROL Precision Limit Switches

90-Degree Straight Touch Limit Switches

Features

- Slim design
- 90-degree cable orientation
- Long-stroke models available
- 5 micron (µm) repeat accuracy
- Stainless steel housing
- Metal bearing

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 Type	Barrel Diameter/Thread*	Stroke	Switching Output	Contact Force	Connection Type
CSS60A-LR	$-6bol:	PDF	Ø 2mm plunger [0.079in] SR 1.5mm [0.059in]	Smooth	Ø 6mm	2.8mm [0.110in]	(1) N.O.	1N	Cable 3m [9.84ft]
CS065A-LR	$45ho:	PDF		Threaded	M6x0.5		(1) N.O.		
CS067A-BLR	$45he:	PDF	Ø 2mm plunger [0.079in] Ø 4.5mm flat [0.1.77in]		M6x0.75		(1) N.O.		
CS067A-LR	$;45hf:	PDF	Ø 2mm plunger [0.079in] SR 1.5mm [0.059in]				(1) N.O.		
CS067B-LR	$45hg:	PDF					(1) N.C.		
CS087A-LR	$45hh:	PDF	Ø 3.5mm plunger [0.138in] SR 3 mm [0.118in]		M8x0.75		(1) N.O.		
CSJ055A-LR	$-45hi:	PDF	Ø 2mm plunger [0.079in] SR 1.5 mm [0.059in]		M5x0.5		(1) N.O.		
CSJS50A-LR	$45hp:	PDF		Smooth	Ø 5mm		(1) N.O.		
CSK087A-LR	$45hq:	PDF	Ø 3.5mm plunger [0.138in] SR 3 mm [0.118in]	Threaded	M8x0.75	5mm [0.197in]	(1) N.O.		
CSK087B-LR	$45hs:	PDF					(1) N.C.		

* Ø = diameter, SR = surface radius

CSS60A-LR

CS065A-LR

CS067A-BLR

CS067A-LR

CS067B-LR

CS087A-LR

CSJ055A-LR

CSJS50A-LR

CSK087A-LR

CSK087B-LR

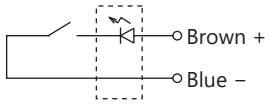
METROL Precision Limit Switches

90-Degree Straight Touch Limit Switches Specifications				
Series	***CS***	***CSS***	***CSJ***	***CSK***
Environmental				
Degree of Protection	IP65			
Temperature Range	Operating: 0 to 80°C [32 to 176°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 N•m [2.95 lb•ft]	N/A	2 N•m [1.48 lb•ft]	7 N•m [5.16 lb•ft]
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction			
Shock	300 m/s² for X, Y, Z each direction			
Repeat Accuracy	5 micron (µm) *			
Recommended Minimum Operating Speed	50mm (1.96in)/minute			
Electrical Ratings				
Contact Life	10 million operations			
Contact Voltage	5–24VDC			
Steady Current Rating	10mA or less			
Max In-rush Current Rating	10mA (limit current to protect LED indicator)			
Connection Type	Cable: 3m [9.84 ft], oil resistant, Ø2.8/2 cores, tensile strength 30N [6.74 lbf], minimum bending R7, 2-26AWG			
Indicating	-L: LED indicator (mounted in cable 120mm from the switch)			

*** At operating speed 50-200 mm/minute. Operating speed slower than 10 mm/min is not recommended.**

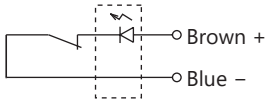
Circuit Diagrams

Normally open (N.O.)



LED Normally Off

Normally closed (N.C.)



LED Normally On

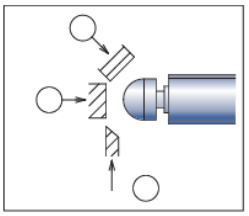
METROL Precision Limit Switches

Sliding Angled Offset Touch Limit Switches

Features

- Metal and plastic hemisphere actuators
- 5 micron (µm) repeat accuracy
- Stainless steel housing

Sliding Angled Offset Touch



O indicates correct target approach and orientation.

Sliding Angled Offset 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	$01n8c:	PDF	Ø 4.7mm plunger SR 3mm	Threaded	M8×0.5	2.8mm [0.110in]	(1) N.O.	1N	Cable 2m [6.56 ft]
CSHP085B-L	$01n8d:	PDF	Ø 4.7mm plunger SR 3mm	Threaded	M8×0.5		(1) N.C.	1N	
CSH121A-A	$6boo:	PDF	Ø 10mm hemisphere SR 5mm	Threaded	M12x1		(1) N.O.	1.5N	
CSH121A-AL	$-45hj:	PDF	Ø 10mm hemisphere SR 5mm	Threaded	M12x1		(1) N.O.	1.5N	
CSH121B-AL	$45hk:	PDF	Ø 10mm hemisphere SR 5mm	Threaded	M12x1		(1) N.C.	1.5N	
CSH121A-APL	$-45hl:	PDF	Ø 10mm hemisphere SR 5mm plastic	Threaded	M12x1		(1) N.O.	1.5N	
CSH121B-APL	$45hn:	PDF	Ø 10mm hemisphere SR 5mm plastic	Threaded	M12x1		(1) N.C.	1.5N	

*** Ø = diameter, SR = surface radius**

CSHP085B-L

CSH121A-A

CSH121A-AL

CSH121B-AL

CSH121A-APL

CSH121B-APL

METROL

Precision Limit Switches

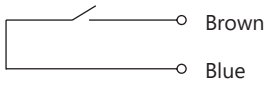
Sliding Angled Offset Touch Limit Switches Specifications		
Series	***CSHP***	***CSH***
Environmental		
Degree of Protection	IP67	IP65
Temperature Range	Operating: 0 to 80°C [32 to 176°F] (Ice-free)	
Mechanical Ratings		
Enclosure Material	Stainless Steel	
Pretravel	0.3 mm	
Torque (for nuts on threaded barrels, set screws on smooth barrels)	4 N•m [2.95 lb•ft]	12 N•m [8.85 lb•ft]
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction	
Shock	300 m/s² for X, Y, Z each direction	
Repeat Accuracy	0.005mm (5 micron [µm]) *	
Recommended Minimum Operating Speed	50mm [1.96in]/minute	
Electrical Ratings		
Contact Life	10 million operations	
Contact Voltage	5–24VDC	
Steady Current Rating	10mA or less	
Max In-rush Current Rating	10mA (limit current to protect LED indicator)	
Connection Type	Cable: 2m [6.56ft] , oil resistant Ø2.8/2 cores, Tensile strength 30N [6.74 lbf], minimum bending R7, 2-26AWG	
Indicating	-L: LED indicator (mounted in cable 120mm from the switch)	

*** At operating speed 50-200 mm/minute. Operating speed slower than 10mm/min is not recommended.**

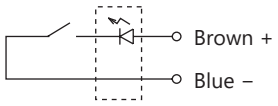
Circuit Diagrams

Without LED	With LED

Normally open (N.O.)

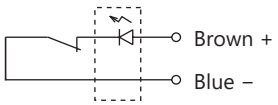


Normally open (N.O.)



LED Normally Off

Normally closed (N.C.)



LED Normally On

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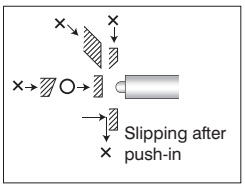
Precision Limit Switches

Precision Mini Straight Touch Limit Switches

Features

- Mini size suitable for machines required to be small and for narrow installation space
- Stroke length (1.5mm)
- 3 micron (µm) 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.

Precision Mini Straight 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
CSM105CA	$6bon:	PDF	Ø 3.5mm plunger SR 2.5mm	Threaded	M10×0.5	1.5mm	(1) N.O.	1N	Cable 2m [6.56ft]
CSM105WA	$2bx5:	PDF	Ø 3.5mm plunger SR 2.5mm	Threaded	M10×0.5	1.5mm	(1) N.O.	1N	Core wire 0.5m [1.64ft]
CSMP105WA	$2bx6:	PDF	2mm plunger with boot SR 2.5mm	Threaded	M10×0.5	1.5mm	(1) N.O.	1N	Core wire 0.5m [1.64ft]
CSM105CA-L	$45hu:	PDF	Ø 3.5mm plunger SR 2.5mm	Threaded	M10×0.5	1.5mm	(1) N.O.	1N	Cable 2m [6.56ft]
CSMP105CA-L	$45hv:	PDF	2mm plunger with boot SR 2.5mm	Threaded	M10×0.5	1.5mm	(1) N.O.	1N	Cable 2m [6.56ft]

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

CSM105CA

CSM105WA

CSMP105WA

CSM105CA-L

CSMP105CA-L

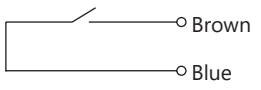
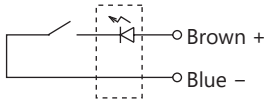
METROL

Precision Limit Switches

Precision Mini Straight Touch Limit Switches Specifications		
Type	***Precision Angled***	***Precision Mini***
Series	***CSM***	***CSMP***
Environmental		
Degree of Protection	IP65	IP67
Temperature Range	Operating: 0 to 80°C [32 to 176°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 N•m [5.901 lb•ft]	
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction	
Shock	300 m/s² for X, Y, Z each direction	
Repeat Accuracy	Both On–Off, Off–On: 0.003 mm*	
Recommended Minimum Operating Speed	50mm [1.96in]/minute	
Electrical Ratings		
Contact Life	10 million operations	
Contact Voltage	5–24VDC	
Steady Current Rating	10mA or less	
Max In-rush Current Rating	10mA (limit current to protect LED indicator)	
Connection Type	Core wire cable, 0.5 m (x2), oil resistant, Ø 0.6, tensile strength 15N, Cable: 2m, oil resistant Ø2.8/2 cores, tensile strength 30N [6.74 lbf], 2-26AWG	
Indicating	-L: LED indicator (mounted in cable 120mm from the switch)	

*** At operating speed 50-200 mm/minute. Operating speed slower than 10mm/min is not recommended.**

Circuit Diagrams

Without LED	*With LED*
Normally open (N.O.)  	Normally open (N.O.)  LED Normally Off

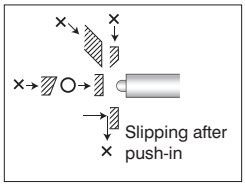
METROL Precision Limit Switches

High-Vacuum Resistance Limit Switches

Features

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

High Vacuum Resistance

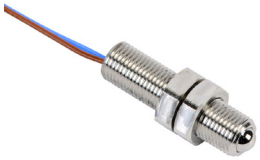


O indicates correct target approach and orientation.
X indicates approach and orientation that should be avoided.

High-Vacuum Resistance Limit 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	$04vzc:	Angled touch ball plunger SR 3mm	Threaded	M5x0.5	1.0mm [0.039in]	(1) N.O.	0.01mm [0.00039in]	1N	Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5m [1.6ft] core wire, 27 AWG	PDF
GN-BP5MA-R	$04vzd:	Angled touch ball plunger SR 3mm	Threaded	M5x0.5	1.0mm [0.039in]	(1) N.O.	0.01mm [0.00039 n]	1N	Cable direction: 90° Polytetrafluoroethylene (PTFE) 0.5m [1.6ft] core wire, 27 AWG	PDF
GN-PT5M3A	$-045i0:	Straight touch Ø 1.5mm plunger SR 2mm	Threaded	M5x0.5	1.5mm [0.059in]	(1) N.O.	0.003mm [0.00012in]	0.5N	Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5m [1.6ft] core wire, 27 AWG	PDF
GN-PT5M3B	$-045i1:	Straight touch Ø 1.5mm plunger SR 2mm	Threaded	M5x0.5	1.5mm [0.059in]	(1) N.C.	0.003mm [0.00012in]	0.5N	Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5m [1.6ft] core wire, 27 AWG	PDF
GN-BP161B	$;004vze:	Angled touch Ø 2mm plunger SR 4mm	Threaded	M16x1	2.9mm [0.114in]	(1) N.C.	0.01mm [0.00039in]	1.5N	Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5m [1.6ft] core wire, 27 AWG	PDF
GN-CSK141B	$;004vz9:	Straight touch Ø 12mm plunger SR 4mm	Threaded	M14x1	5mm [0.197mm]	(1) N.C.	0.01mm [0.00039in]	0.8N	Cable direction: straight Polytetrafluoroethylene (PTFE) 0.5m [1.6ft] core wire, 27 AWG	PDF

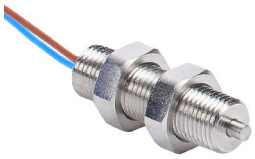
*** Ø = diameter, SR = surface radius**



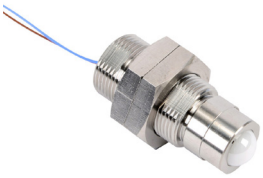
GN-BP5MA

GN-BP5MA-R

GN-PT5M3A



GN-PT5M3B



GN-BP161B

GN-CSK141B

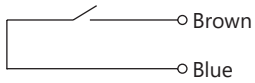
METROL Precision Limit Switches

High-Vacuum Resistance Limit Switches Specifications	
Series	***GN***
Environmental	
Compatible Vacuum	10^{-5} PA
Degree of Protection	IP40
Temperature Range	120°C [248°F] (allowable baking temperature)
Mechanical Ratings	
Enclosure Material	304 Stainless Steel
Pretravel	0mm [0in]:(GN-PT5M3B, GN-CSK141B) * 0.2 mm [0.0079 in]: (GN-BP161B) 0.3 mm [0.0118 in]: (GN-BP5MA, GN-BP5MA-R, GN-PT5M3A)
Torque (for nuts on threaded barrels, set screws on smooth barrels)	1 N•m [0.73 lb•ft] GN-PT5M3A, GN-PT5M3B, GN-BP5MA 10 N•m [7.37 lb•ft] GN-CSK141B 12 N•m [8.85 lb•ft] GN-BP161B
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction
Shock	300 m/s² for X, Y, Z each direction
Electrical Ratings	
Contact Life	3 million operations
Repeat Accuracy*	Both On-Off, Off-On: See Selection Table
Recommended Minimum Operating Speed	50mm [1.96in] / minute
Contact Voltage	5-24 VDC
Steady Current Rating	10mA or less
Max In-rush Current Rating	20mA
Connection Type	0.5 m [19.69 in] Polytetrafluoroethylene (PTFE) core wire, 27AWG
Indicating	N/A

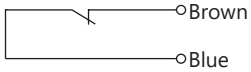
*** Adjust the installed location of the switch by the signal switching point.**
**** At operating speed 50-200 mm/minute. Operating speed slower than 10 mm/min is not recommended.**

Circuit Diagrams

Normally open (N.O.)



Normally closed (N.C.)



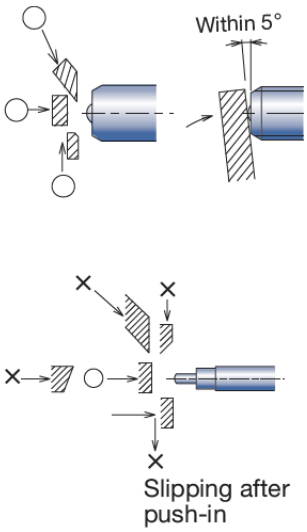
METROL **Precision Limit Switches**

High Temperature: HT Series Limit Switches

Features

- Plunger and ball plunger models
- Constructed using heat resistant parts and adhesives
- Heat resistant cable
- Operating temperature upper limit of 200°C [392°F]

High Temperature HT Series



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

High Temperature 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	$04vza:	Ø2mm plunger, SR 1.5mm	Threaded	M6×0.75	2.8mm	(1) N.O.	1N	Cable 2m [6.56ft]	PDF
Indexing/Angled/Sliding Touch/Ball Plunger									
HT-BP060A	$04vzb:	Ø 3mm ball plunger	Threaded	M6×1.0	0.8mm	(1) N.O.	6-13N	Cable 2m [6.56ft]	PDF
Heat Resistant Stopper Bolt									
STS060A-HT2	$045h?:	1.5mm plunger 3.4mm flat	Threaded	M6×1.0	0.7mm	(1) N.O.	1N	Cable 2m [6.56ft]	PDF
STM82A-HT2	$;045h,:	Ø 3mm plunger with boot	Threaded	M10×0.75	0.3mm	(1) N.O.	1N	Cable 2m [6.56ft]	PDF

*** Ø = diameter, SR = surface radius**

HT-CS067A

HT-BP060A

STS060A-HT2

STM82A-HT2

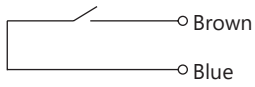
METROL Precision Limit Switches

High Temperature Limit Switches Specifications				
Part Number	***HT-CS067A***	***HT-BP060A***	***STS060A-HT2***	***STM82A-HT2***
Environmental				
Degree of Protection	IP65**	IP40**	IP40**	IP65**
Temperature Range	Operating: 0 to 200°C [32 to 392°F] (Ice-free)			
Mechanical Ratings				
Enclosure Material	Stainless Steel			
Pretravel	0.3 mm (0.012 in)	0.5 mm [0.020 in] from end face	0.3 mm [0.012 in] from stopping face	Middle of stroke
Vibration	10–55 Hz total amplitude 1.5 for X, Y, Z each direction			
Shock	300 m/s² for X, Y, Z each direction			
Electrical Ratings				
Contact Life	3 million operations			
Repeat Accuracy	0.01 mm [0.00039 in] * **			
Recommended Minimum Operating Speed	50mm [1.96in]/minute			
Contact Voltage	5-24 VDC			
Steady Current Rating	10mA or less			
Max In-rush Current Rating	20mA			
Connection Type	Cable: 2m [6.56ft] heat-resistant Ø 2.8 2 cores, 24AWG		Cable: 2m [6.56ft] heat-resistant Ø 2.8 2 cores, 26AWG	
Indicating	N/A			

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

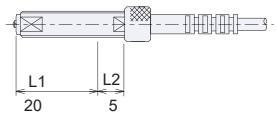
Circuit Diagrams

Normally open (N.O.)

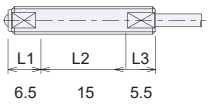


Torque Limits

Stopper Bolt



Ball Plunger



Tightening Torque for Case Screws and Nuts						
Applicable Models	***L1***		***L2***		***L3***	
	Length	***Tightening Torque***	***Length***	***Tightening Torque***	***Length***	***Tightening Torque***
HT-CS067A	6.5mm	4 N•m [2.95 lb•ft]	—	—	—	—
HT-BP060A	6.5mm	2.5 N•m [1.84 lb•ft]	15 mm	5 N•m [3.68 lb•ft]	5.5mm	5 N•m [3.68 lb•ft]
STS060A-HT2	20mm	5 N•m [3.68 lb•ft]	5mm	5 N•m [3.68 lb•ft]	—	—
STM82A-HT2	6.5mm	10 N•m [7.376 lb•ft]	—	—	—	—

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.

METROL

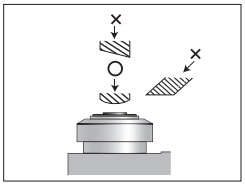
Precision Limit Switches

High Precision Touch and Tool Setter Limit Switches

Features

- Tool setter for blade positioning, wear detection, breakage, etc.
- 0.5 micron (µm) repeat accuracy
- No movement differential
- No temperature drift
- Dustproof / water-resistant (IP67)
- LED indicator

Tool Setter



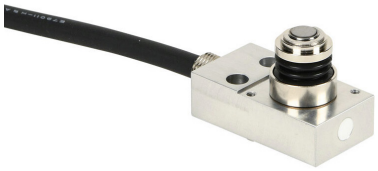
O indicates correct target approach and orientation.

X indicates approach and orientation that should be avoided.

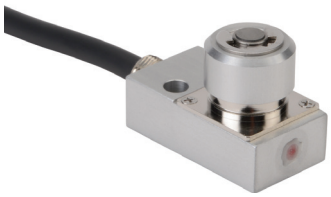
High Precision Touch and Tool Setter Limit Switches Selection Chart

Part Number	Price	Drawing Link	Actuator/Head Type*	Mounting Direction	Mounting Hole	Stroke	Switching Output	Contact Force	Connection Type
P11DDB-DLD	$06bop:	PDF	Ø 16mm plunger, Ø5mm flat	downward	(2) Ø 4.6	3mm	(1) N.C.	1.5N	Cable 3m [9.8ft]
P11DDB-DULD	$01n8o:	PDF	Ø 16mm plunger, Ø 5mm flat	upward	(2) Ø 4.6	3mm	(1) N.C.	1.5N	Cable 3m [9.8ft]
P11DMB-DULD	$06boq:	PDF	Ø 16mm plunger, Ø 5mm flat	upward	(2) M4	3mm	(1) N.C.	1.5N	Cable 3m [9.8ft]
P11EDB-DULD	$02bvk:	PDF	Ø 16mm plunger, Ø 5mm flat	upward	(2) Ø 4.6	5mm	(1) N.C.	1.5N	Cable 3m [9.8ft]
P21EDBP-22-28	$-02bvl:	PDF	Ø 18.5mm plunger, Ø 10mm flat	upward	(2) Ø 4.6	5mm	(1) N.C.	1.5N	Cable 5m [16.4ft]

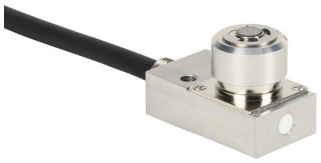
*** Ø = diameter**
-xxLD: LED indicator (attached to sensor)
P21EDBP-22-28 includes M5 air inlet



P11DDB-DLD



P11DDB-DULD



P11DMB-DULD

P11EDB-DULD

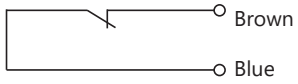
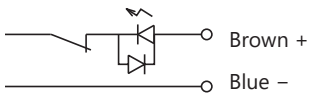
P21EDBP-22-28

METROL Precision Limit Switches

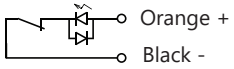
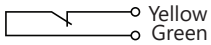
High Precision Touch and Tool Setter Limit Switches Specifications		
Series	***P11***	***P21***
Environmental		
Degree of Protection	IP67	
Temperature Range	Operating: 0 to 80°C [32 to 176°F] (Ice-free)	
Mechanical Ratings		
Enclosure Material	Aluminum	
Pretravel	0*	1st signal 0*, 2nd signal 2.5 mm (0.098 in)
Torque (for nuts on threaded barrels, set screws on smooth barrels)	N/A	
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction	
Shock	300 m/s² for X, Y, Z each direction	
Repeat Accuracy	Both On–Off, Off–On: 0.0005 mm (range)**	
Recommended Minimum Operating Speed	50mm [1.96in]/minute	
Electrical Ratings		
Contact Life	3 million operations	
Contact Voltage	5–24VDC	
Steady Current Rating	10mA or less	
Max In-rush Current Rating	10mA (limit current to protect LED indicator)	
Connection Type	Cable: 3m (9.84 ft) oil resistant Ø5/2 cores (P08: Ø4/2 cores) Tensile strength 30N, minimum bending R7, 30AWG	Cable: 5m (16.40ft) oil resistant Ø3.7/4 cores (P08: Ø4/2 cores), Tensile strength 30N, minimum bending R7, 30AWG
Indicating	-L: LED indicator (mounted in cable 120mm from the switch)	

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

Circuit Diagrams

Without LED	*With LED*
Normally closed (N.C.)  	Normally 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.)

METROL Precision Limit Switches

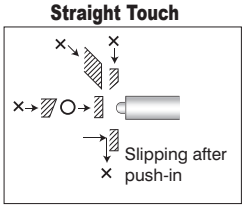
Mini Stopper Precision Limit Switches

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 (µm) repeat accuracy
- No movement differential
- No temperature drift

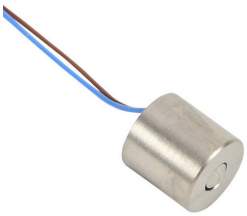


O indicates correct target approach and orientation. X indicates approach and orientation that should be avoided.

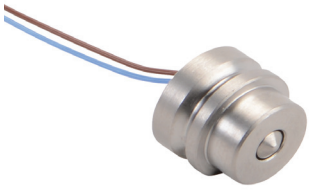
Mini Stopper Precision Limit Switches Selection Chart

Part Number	Price	Drawing Link	Actuator/Head Type*	Barrel Type	Barrel Diameter/ Thread	Stroke	Switching Output	Contact Force	Connection Type
STM11A	$;6bo[:	PDF	Ø 3mm plunger, 8mm flat	Smooth	Ø8	0.5mm		0.8N	
STM13A	$2bvn:	PDF	Ø 3mm plunger, 8mm flat	Smooth	Ø10	0.5mm		0.8N	Core wire, 0.5m [1.6ft]
STM31A	$2bvv:	PDF	Ø 3mm plunger, 8mm flat	Threaded	M10×0.75	0.5mm		0.8N	
STM32A	$;6bo]:	PDF	Ø 3mm plunger, 8mm flat	Threaded	M10×0.75	0.5mm		0.8N	Cable, 2m [6.5ft]
STM34A	$6boz:	PDF	Ø 3mm plunger, 8mm flat	Threaded	M10×1.5	0.5mm		0.8N	Cable, 2m [6.5ft]
STM63A	$2bvu:	PDF	Ø 3mm plunger with boot, Ø 2.5mm	Smooth	Ø11	0.3mm		1N	
STM81A	$2bvx:	PDF	Ø 3mm plunger with boot, Ø 2.5mm	Threaded	M10×0.75	0.3mm		1N	Core wire, 0.5m [1.6ft]
STM83A	$2bvz:	PDF	Ø 3mm plunger with boot, Ø 2.5mm	Threaded	M10×1.5	0.3mm	(1) N.O.	1N	
STM14A-L	$;2bv]:	PDF	Ø 3mm plunger, 8mm flat	Smooth	Ø10	0.5mm		0.8N	
STM36A-L	$6bo_:	PDF	Ø 3mm plunger, 4.5mm flat	Threaded	M10×0.75	0.5mm		0.8N	
STM64A-L	$;2bv[:	PDF	Ø 3mm plunger with boot, Ø 2.5mm	Smooth	Ø11	0.3mm		1N	
STM32A-L	$2bv_:	PDF	Ø 3mm plunger, 8mm flat	Threaded	M10×0.75	0.5mm		0.8N	Cable, 2m [6.5ft]
STM82A-L	$2bv#:	PDF	Ø 3mm plunger with boot, Ø 2.5mm	Threaded	M10×0.75	0.3mm		1N	
STM34A-L	$;2bv!:	PDF	Ø 3mm plunger, 13mm flat	Threaded	M10×1.5	0.5mm		0.8N	
STM84A-L	$2bv?:	PDF	Ø 3mm plunger with boot, Ø 2.5mm	Threaded	M10×1.5	0.3mm		1N	

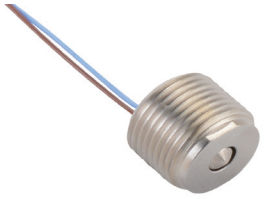
* Ø = diameter



STM11A



STM13A



STM31A

STM32A

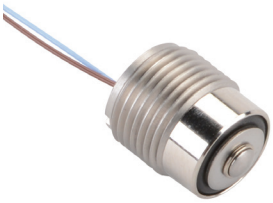
STM34A

METROL Precision Limit Switches

Mini Stopper: STM Series

STM36A-L

STM63A



STM81A

STM83A

STM14A-L

STM64A-L

STM32A-L

STM82A-L

STM34A-L

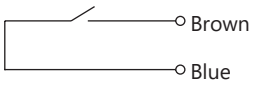
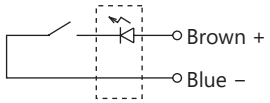
STM84A-L

METROL Precision Limit Switches

Mini Stopper Precision Limit Switches Specifications	
Series	***STM***
Environmental	
Degree of Protection	IP44 (STM11A, STM13A, STM31A, STM32A, STM34A STM14A-L, STM32A-L, STM34A-L) IP67 (STM63A STM81A, STM83A, STM64A-L, STM82A-L, STM84A-L)
Temperature Range	Operating: 0 to 80°C [32 to 176°F] (Ice-free)
wMechanical Ratings	
Enclosure Material	Stainless Steel
Torque (for nuts on threaded barrels, set screws on smooth barrels)	10Nm
Vibration	10–55Hz total amplitude 1.5 for X, Y, Z each direction
Shock	300 m/s² for X, Y, Z each direction
Withstand Load	3000N
Repeat Accuracy	Both On→Off, Off→On/ 0.01 (range) (At operating speed 50-200mm/min) *
Recommended Minimum Operating Speed	50mm [1.96in]/minute
Electrical Ratings	
Contact Life	10 million (No bungle caused by vibration and use under contact rating)
Impact Resistance	0.2J
Contact Voltage	5–24VDC
Steady Current Rating	10mA or less
Max In-rush Current Rating	20mA without LED indicator, 10mA with LED indicator
Connection Type	Standard length 2m or 0.5 m Oil resistant 2.8 / 2 cores, Tensile strength 30N, minimum bending R7
Indicating	-L models: LED indicator (mounted in cable 120mm from the switch)

*** At operating speed 50-200 mm/minute. Operating speed slower than 10 mm/min is not recommended.**

Circuit Diagrams

Without LED	*With LED (-L models)*
Normally open (N.O.)  	Normally open (N.O.)  LED Normally Off

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

IDEM Plunger Series Micro Switches							
Part Number	***Price***	***Drawing Link***	***Actuator Type***	***Snap Action Contacts***	***Pretravel (max)***	***Over Travel***	***Force to Operate Contacts***
176101-1	$42x#:	PDF	Metal pin plunger	(1) N.O./(1) N.C.	0.4 mm [0.016 in]	0.13 mm [0.005 in]	250-350 g [0.55-0.77 lb]
176101-5	$42y6:	PDF	Metal pin plunger (pack of 5)				
176104-1	$;42x,:	PDF	Metal pin plunger long	(1) N.O./(1) N.C.	0.4 mm [0.016 in]	1.6 mm [0.063 in]	250-350 g [0.55-0.77 lb]
176104-5	$42y9:	PDF	Metal pin plunger long (pack of 5)				
176105-1	$42xx:	PDF	Metal plunger	(1) N.O./(1) N.C.	0.4 mm [0.016 in]	1.6 mm [0.063 in]	250-350 g [0.55-0.77 lb]
176105-5	$42ya:	PDF	Metal plunger (pack of 5)				
176106-1	$42xy:	PDF	Metal plunger with fixing nuts	(1) N.O./(1) N.C.	0.4 mm [0.016 in]	5.5 mm [0.217 in]	250-350 g [0.55-0.77 lb]
176106-5	$42yb:	PDF	Metal plunger with fixing nuts (pack of 5)				
176107-1	$42xz:	PDF	Metal plunger with metal roller and fixing nuts	(1) N.O./(1) N.C.	0.4 mm [0.016 in]	3.58 mm [0.141 in]	250-350 g [0.55-0.77 lb]
176107-5	$42yc:	PDF	Metal plunger with metal roller and fixing nuts (pack of 5)				
176108-1	$;42x]:	PDF	Metal plunger with metal cross roller and fixing nuts	(1) N.O./(1) N.C.	0.4 mm [0.016 in]	3.58 mm [0.141 in]	250-350 g [0.55-0.77 lb]
176108-5	$42yd:	PDF	Metal plunger with metal cross roller and fixing nuts (pack of 5)				

176000-1	$42x_:	PDF	IDEM terminal enclosure, PVC. For use with IDEM micro limit switches.
176000-5	$42y5:	PDF	IDEM terminal enclosure, PVC. Package of 5. For use with IDEM micro limit switches.

176101-1

176104-1

176105-1

176106-1

176107-1

176108-1

176000-1

IDEM Micro Switches, Plunger Series

Operating Characteristics

Metal Pin Plunger (176101)

Operating Characteristics	
Operating Force	250-350 g [0.55-0.77 lb]
Release Force (min)	114g [0.25 lb]
Pre-Travel (max)	0.4 mm [0.016 in]
Over-Travel (min)	0.13 mm [0.005 in]
MD (max)	0.05 mm [0.002 in]
Operating Position	15.9 ± 0.4 mm [0.626±0.016 in]

Metal Pin Plunger Long (176104)

Operating Characteristics	
Operating Force	250-350 g [0.55-0.77 lb]
Release Force (min)	114g [0.25 lb]
Pre-Travel (max)	0.4 mm [0.016 in]
Over-Travel (min)	1.6 mm [0.063 in]
MD (max)	0.5 mm [0.020 in]
Operating Position	28.2 ± 0.5 mm [1.110±0.020 in]

Metal Plunger (176105)

Operating Characteristics	
Operating Force	250-350 g [0.55-0.77 lb]
Release Force (min)	114g [0.25 lb]
Pre-Travel (max)	0.4 mm [0.016 in]
Over-Travel (min)	1.6 mm [0.063 in]
MD (max)	0.05 mm [0.002 in]
Operating Position	21.5 ± 0.5 mm [0.846±0.020 in]

Metal Plunger With Fixing Nuts (176106)

Operating Characteristics	
Operating Force	250-350 g [0.55-0.77 lb]
Release Force (min)	114g [0.25 lb]
Pre-Travel (max)	0.4 mm [0.016 in]
Over-Travel (min)	5.5 mm [0.217 in]
MD (max)	0.05 mm [0.002 in]
Operating Position	21.8 ± 0.8 mm [0.858±0.032in]

Metal Plunger With Metal Roller and Fixing Nuts (176107)

Operating Characteristics	
Operating Force	250-350 g [0.55-0.77 lb]
Release Force (min)	114g [0.25 lb]
Pre-Travel (max)	0.4 mm [0.016 in]
Over-Travel (min)	3.58 mm [0.141 in]
MD (max)	0.05 mm [0.002 in]
Operating Position	33.4 ± 1.2 mm [1.315±0.047 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 g [0.55-0.77 lb]
Release Force (min)	114g [0.25 lb]
Pre-Travel (max)	0.4 mm [0.016 in]
Over-Travel (min)	3.58 mm [0.141 in]
MD (max)	0.05 mm [0.002 in]
Operating Position	33.4 ± 1.2 mm [1.315±0.047 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

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

IDEM Lever Series Micro Switches							
Part Number	*Price*	*Drawing Link*	*Actuator Type*	*Snap Action Contacts*	*Pretravel (max)*	*Over Travel*	*Force to Operate Contacts*
176102-1	$;42x!:	PDF	Lever	(1) N.O./(1) N.C.	4 mm [0.157 in]	1.6 mm [0.063 in]	141g [0.31 lb]
176102-5	$42y7:	PDF	Lever (pack of 5)				
176103-1	$42x?:	PDF	Lever with steel roller	(1) N.O./(1) N.C.	4 mm [0.157 in]	1.6 mm [0.063 in]	141g [0.31 lb]
176103-5	$42y8:	PDF	Lever with steel roller (pack of 5)				
176109-1	$;42x[:	PDF	Lever hinge long	(1) N.O./(1) N.C.	10 mm [0.394 in]	5.6 mm [0.220 in]`	70g [0.15 lb]
176109-5	$42ye:	PDF	Lever hinge long (pack of 5)				
176110-1	$42y0:	PDF	Lever hinge	(1) N.O./(1) N.C.	7 mm [0.276 in]	3.5 mm 0.138 in]	90g [0.2 lb]
176110-5	$;42yf:	PDF	Lever hinge (pack of 5)				
176111-1	$42y1:	PDF	Lever hinge long with steel roller	(1) N.O./(1) N.C.	7.1 mm [0.280 in]	4 mm [0.157 in]	100g [0.22 lb]
176111-5	$42yg:	PDF	Lever hinge long with steel roller (pack of 5)				
176112-1	$42y2:	PDF	Lever hinge with steel roller	(1) N.O./(1) N.C.	2.7 mm [0.106 in]	2.4 mm [0.094 in]	160g [0.35 lb]
176112-5	$42yh:	PDF	Lever hinge with steel roller (pack of 5)				
176113-1	$42y3:	PDF	One-way horizontal hinge lever with steel roller	(1) N.O./(1) N.C.	2.7 mm [0.106 in]	2.4 mm [0.094 in]	170g [0.37 lb]
176113-5	$-42yi:	PDF	One-way horizontal hinge lever with steel roller (pack of 5)				

176000-1	$42x_:	PDF	IDEM terminal enclosure, PVC. For use with IDEM micro limit switches.
176000-5	$42y5:	PDF	IDEM terminal enclosure, PVC. Package of 5. For use with IDEM micro limit switches.

176102-1

176103-1

176109-1

176110-1

176111-1

176112-1

176113-1

176000-1

IDEM Micro Switches, Lever Series

Operating Characteristics

Lever (176102)

Operating Characteristics	
Operating Force	141g [0.31 lb]
Release Force (min)	14g [0.03 lb]
Pre-Travel (max)	4 mm [0.157 in]
Over-Travel (min)	1.6 mm [0.063 in]
MD (max)	1.3 mm [0.051 in]
FP (max)	20.8 mm [0.819 in]
Operating Position	17.4 ± 0.8mm [0.685 ± 0.031 in]

Lever With Steel Roller (176103)

Operating Characteristics	
Operating Force	141g [0.31 lb]
Release Force (min)	14g [0.03 lb]
Pre-Travel (max)	4 mm [0.157 in]
Over-Travel (min)	1.6 mm [0.063 in]
MD (max)	1.3 mm [0.051 in]
FP (max)	31.8 mm [1.252 in]
Operating Position	28.6 ± 0.8 mm [1.126 ± 0.031 in]

Lever Hinge Long (176109)

Operating Characteristics	
Operating Force	70g [0.15 lb]
Release Force (min)	14g [0.03 lb]
Pre-Travel (max)	10 mm [0.394 in]
Over-Travel (min)	5.6 mm [0.220 in]
MD (max)	1.27 mm [0.050 in]
FP (max)	28.2 mm [1.110 in]
Operating Position	19 ± 0.8 mm [0.748 ± 0.031 in]

Lever Hinge (176110)

Operating Characteristics	
Operating Force	90g [0.2 lb]
Release Force (min)	18g [0.04 lb]
Pre-Travel (max)	7 mm [0.276 in]
Over-Travel (min)	3.5 mm 0.138 in]
MD (max)	1 mm [0.039 in]
FP (max)	26.2 mm [1.031 in]
Operating Position	19.8 ±0.8 mm [0.780 ±0.032 in]

Lever Hinge Long With Steel Roller (176111)

Operating Characteristics	
Operating Force	100g [0.22 lb]
Release Force (min)	22g [0.05 lb]
Pre-Travel (max)	7.1 mm [0.280 in]
Over-Travel (min)	4 mm [0.157 in]
MD (max)	1.02 mm [0.040 in]
FP (max)	36.5 mm [1.437 in]
Operating Position	30.2 ± 0.4 mm [1.189 ± 0.016 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

Operating Characteristics (continued)

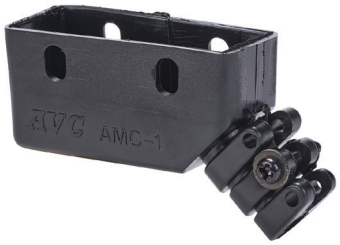
Lever Hinge With Steel Roller (176112)

Operating Characteristics	
Operating Force	160g [0.35 lb]
Release Force (min)	42g [0.09 lb]
Pre-Travel (max)	2.7 mm [0.106 in]
Over-Travel (min)	2.4 mm [0.094 in]
MD (max)	0.5 mm [0.020 in]
FP (max)	32.5 mm [1.280 in]
Operating Position	30.2 ± 0.4 mm [1.189 ± 0.016 in]

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

Operating Characteristics	
Operating Force	170g [0.37 lb]
Release Force (min)	42g [0.09 lb]
Pre-Travel (max)	2.7 mm [0.106 in]
Over-Travel (min)	2.4 mm [0.094 in]
MD (max)	0.51 mm [0.020 in]
FP (max)	43.6 mm [1.717 in]
Operating Position	41.3 ± 0.8 mm [1.626 ± 0.031 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°C [-13 to 176°F]
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	15m Ohms max (initial)
Electrical Ratings	0.5 A 125VDC 0.25 A 250VDC 0.125 hp 125VDC 0.25 hp 250VDC 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 100VAC (50/60 Hz for 1 minute)
Electrical Life	100,000 operations at full load
Wiring Connections	M4x5.5 terminal screw
Torque Requirements	Mounting screws: 1.5 N•m [1.11 lb•ft] Connector screws: 1.0 to 1.2 N•m [0.74 to 0.89 lb•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

Metal Housing (Halogen-Free Cable)

AEM2G Series

- Die-cast metal housings
- 1m halogen-free cable
- 1 N.O. and 1 N.C. contact on all units
- Compact size with standard 25mm 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.

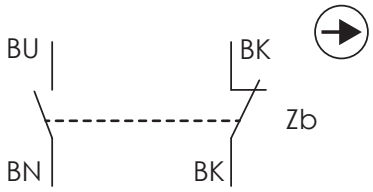
AEM2G Series Compact Limit Switches Selection Chart

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed (m/s [ft/sec])	Min. Actuation Force (N) or Torque (N•m)	Min. Positive Opening Force (N) or Torque (N•m)	Connection Type
AEM2G12Z11-HF1	$;4atb:	PDF	Metal plunger with metal roller	0.1 [0.33]	10N [2.25 lbf]	30N [6.74 lbf]	3.28 ft [1m] cable, bottom exit
AEM2G16Z11-HF1	$;4atc:	PDF	Metal plunger with dust cap	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	3.28 ft [1m] cable, bottom exit
AEM2G42Z11-HF1	$;4atd:	PDF	Side rotary lever with 14mm metal roller	1.5 [4.92]	0.08 N•m [0.06 lb•ft]	0.28 N•m [0.21 lb•ft]	3.28 ft [1m] cable, bottom exit
AEM2G51Z11-HF1	$;4ate:	PDF	Side rotary adjustable lever with 18mm nylon roller	1.5 [4.92]	0.08 N•m [0.06 lb•ft]	0.28 N•m [0.21 lb•ft]	3.28 ft [1m] cable, bottom exit
AEM2G71Z11-HF1	$;;4atf:	PDF	Side rotary adjustable 3mm stainless steel rod	1.5 [4.92]	0.08 N•m [0.06 lb•ft]	0.28 N•m [0.21 lb•ft]	3.28 ft [1m] cable, bottom exit
AEM2G93Z11-HF1*	$;4at6:	PDF	360 degree stainless steel spring	0.1 [0.33]	0.10 N•m [0.07 lb•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

AEM2G12Z11-HF1

AEM2G16Z11-HF1

AEM2G71Z11-HF1

AEM2G42Z11-HF1

AEM2G51Z11-HF1

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°C [-40 to 158°F]. Operating: -25 to 70°C [-13 to 158°F]
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	***AC15***	Make: 100A @ 24VAC; 60A @ 120VAC; 30A @ 240VAC Break: 10A @ 24VAC; 6A @ 120VAC; 3A @ 240VAC
	DC13	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		25mΩ
Head Rotation		180 Degree Only
Rated Insulation Voltage		B300, R300 according to UL508 400V (degree of pollution: 3) according to IEC 60947-1
Connection Type		Cable: 1m [3.28 ft] Halogen Free cable, 5 x 0.75mm² (18 AWG). Overall cable diameter: 8mm [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.**

Achieve™ Compact Limit Switches

Plastic Housing Plunger Actuator AEP Series

- Double insulated plastic housing
- 3.28 ft [1m] cable/5-pin M12 quick-disconnect (right exit)
- Compact size with standard 25mm [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.

Compact Limit Switches AEP Series 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	$;4at7:	PDF	Metal plunger	0.5 ms	15N [3.37 lbf]	30N [6.74 lbf]	1 N.O./1 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G11Z11MR	$4axn:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G11Z22-1	$;5[o9:	PDF					2 N.O./2 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G12Z11-1	$;4at8:	PDF	Metal plunger with metal roller	0.1 ms	10N [2.25 lbf]	30N [6.74 lbf]	1 N.O./1 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G12Z11MR	$4axo:	PDF		0.1 ms	10N	30N [6.74 lbf]		5-pin M12 quick-disconnect (right exit)
AEP2G12Z22-1	$;5[oa:	PDF					2 N.O./2 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G16Z11-1	$;4at9:	PDF	Metal plunger with dust cap	0.5 ms	15N [3.37 lbf]	30N [6.74 lbf]	1 N.O./1 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G16Z11MR	$4axp:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G16Z22-1	$;5[ob:	PDF					2 N.O./2 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G21Z22-1	$;5[oc:	PDF	Metal plunger fixing nuts					3.28 ft [1m] cable (bottom exit)
AEP2G22Z22-1	$;5[od:	PDF	Metal plunger with metal roller and fixing nuts		10N [2.25 lbf]			3.28 ft [1m] cable (bottom exit)

AEP2G11Z11-1

AEP2G12Z11-1

AEP2G16Z11-1

Housing style

3.28 ft [1m] cable, (bottom exit)

5-pin M12 quick- disconnect (right exit)

Achieve™ Compact Limit Switches

AEP2G11Z22-1

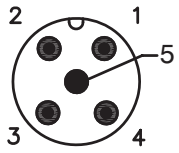
AEP2G12Z22-1

AEP2G16Z22-1

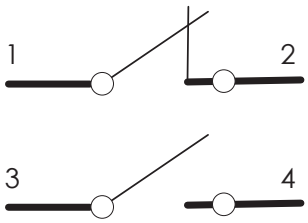
AEP2G21Z22-1

AEP2G22Z22-1

Connector

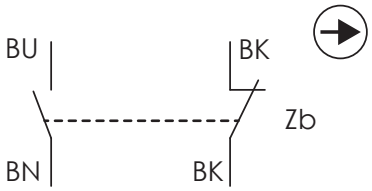


Contact Configuration

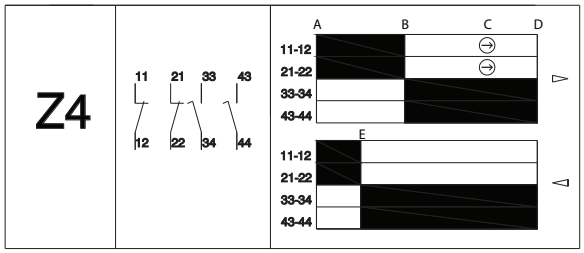


Note: Pin 5 is not connected

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

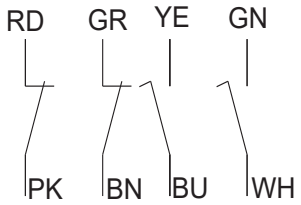


AEP2G11Z22-1, AEP2G16Z22-1 and AEP2G21Z22-1

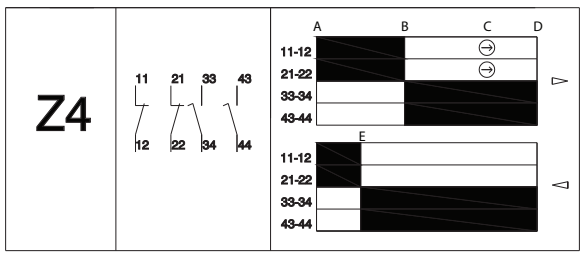


TAG	mm
A	0
B	2.1
C	4
D	5
E	1.3

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



AEP2G12Z22-1 and AEP2G22Z22-1



TAG	mm
A	0
B	3.6
C	7
D	8.7
E	2.3

Achieve™ Compact Limit Switches

Side Rotary Lever Actuator AEP Series

- Double insulated plastic housings
- 3.28 ft [1m] cable/5-pin M12 quick-disconnect (right exit)
- Compact size with standard 25mm [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.

Compact Limit Switches AEP Series Selection Chart

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed	Min. Actuation Force	Min. Positive Opening Force	Number of Contacts	Connection Type
AEP2G41Z11-1	$;4ata:	PDF	Side rotary lever with 14mm nylon roller	1.5 ms	0.08 N•m	0.28 N•m	1 N.O./1 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G41Z11MR	$4axq:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G41Z22-1	$;5[oe:	PDF					2 N.O./2 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G42Z11-1	$;4atg:	PDF	Side rotary lever with 14mm metal roller	1.5 ms	0.08 N•m	0.28 N•m	1 N.O./1 N.C	3.28 ft [1m] cable (bottom exit)
AEP2G42Z11MR	$4axs:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G43Z11-1	$;4ath:	PDF	Side rotary lever with 14mm ball bearing roller	1.5 ms	0.08 N•m	0.28 N•m		3.28 ft [1m] cable (bottom exit)
AEP2G43Z11MR	$;4axt:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G51Z11-1	$;-4ati:	PDF	Side rotary adjustable lever with 18mm nylon roller	1.5 ms	0.08 N•m	0.28 N•m		3.28 ft [1m] cable (bottom exit)
AEP2G51Z11MR	$4axu:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G51Z22-1	$;;5[of:	PDF					2 N.O./2 N.C.	3.28 ft [1m] cable (bottom exit)
AEP2G71Z11-1	$;-4atj:	PDF	Side rotary adjustable 3mm stainless steel rod	1.5 ms	0.08 N•m	0.28 N•m	1 N.O./1 N.C	3.28 ft [1m] cable (bottom exit)
AEP2G71Z11MR	$4axv:	PDF						5-pin M12 quick-disconnect (right exit)

AEP2G41Z22-1

AEP2G42Z11-1

AEP2G43Z11-1

AEP2G51Z22-1

AEP2G71Z11-1

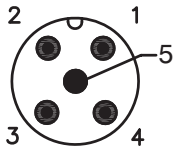
Housing style

3.28 ft [1m] cable, bottom exit

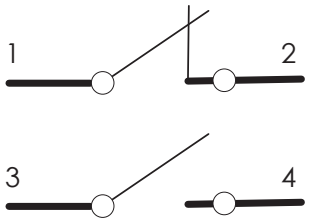
5-pin M12 quick-disconnect (right)

Achieve™ Compact Limit Switches

Connector

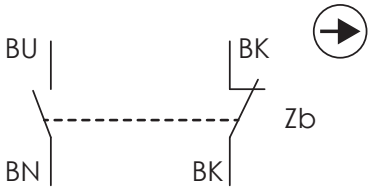


Contact Configuration

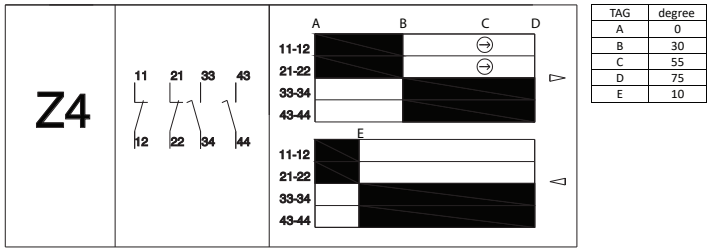


Note: Pin 5 is not connected

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

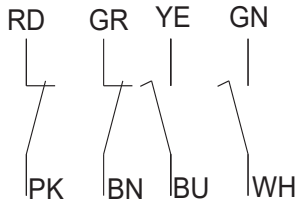


AEP2G41Z22-1 and AEP2G51Z22-1



TAG	degree
A	0
B	30
C	55
D	75
E	10

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



Achieve™ Compact Limit Switches

Plastic Housing Stainless Steel Spring Actuator AEP Series

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

Compact Limit Switches AEP Series Selection Chart

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed	Min. Actuation Force	Min. Positive Opening Force	Number of Contacts	Connection Type
AEP2G92Z11-1	$;4atk:	PDF	360 degree stainless steel spring with nylon tip	0.1 ms	0.10 N•m	—	1 N.O./1 N.C	3.28 ft [1m] cable (bottom exit)
AEP2G92Z11MR	$4axx:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G93Z11-1	$;-4atl:	PDF	360 degree stainless steel spring					3.28 ft [1m] cable (bottom exit)
AEP2G93Z11MR	$4axy:	PDF						5-pin M12 quick-disconnect (right exit)
AEP2G93Z22-1	$;5[og:	PDF					2 N.O./2 N.C	3.28 ft [1m] cable (bottom exit)

AEP2G92Z11-1

AEP2G93Z22-1

Housing style

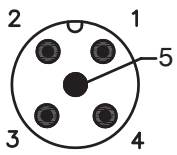
3.28 ft [1m] cable, (bottom exit)

5-pin M12 quick-disconnect (right exit)

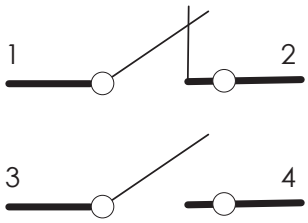
Compact Limit Switches

Plastic Housing Stainless Steel Spring Actuator AEP Series

Connector

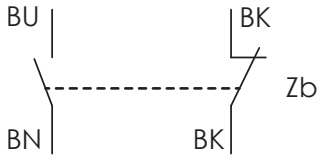


Contact Configuration

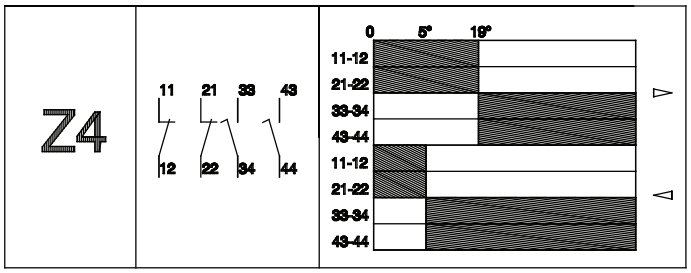


Note: Pin 5 is not connected

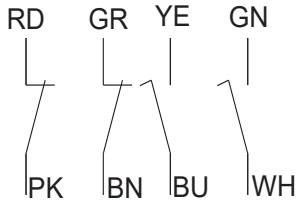
Z11 Snap-action contacts
1 N.O. and 1 N.C.



AEP2G93Z22-1



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



Achieve™ Compact Limit Switch Specifications

Compact Limit Switches AEP Series 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°C [-40 to 158°F]. Operating: -25 to 70°C [-13 to 158°F]	
Mechanical Ratings			
Mechanical Life		10 million operations. Models G11,G12,G41,G42,G43,G51,G71 5 million operations. Models G16, G92, G93	10 million operations
Enclosure Material		Reinforced Thermoplastic	
Contact Blocks Rating			
Positive Opening		All models except 92 and 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	2.8A @ 24VDC; 0.55A @ 125VDC; 0.27A@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	4A @ <500VAC Part number: AEP2G93Z22-1 10A @ <500VAC
Contact Resistance		25mΩ	
Head Rotation		180 Degree Only	
Rated Insulation Voltage		B300, R300 according to UL508 400V (degree of pollution: 3) according to IEC 60947-1	C300 - R300 according to UL508, 250V (degree of pollution 3)
Connection Type		Cable: 1m [3.28 ft] PVC cable, 4 x 0.75mm² (18 AWG). Overall cable diameter: 7mm [0.275 in.] Connector: 5-pin M12 quick disconnect	Pigtail 1m [3.28 ft], PVC, 0.5 mm² [20AWG]
Wiring Terminal Markings		Cable Models: N.C. Black/Black, N.O. Blue/Brown M12 Models: N.C. Pin 1-2, N.O. Pin 3-4	N.C. Gray/Brown Red/Pink N.O. Blue/Yellow Green/White
Electrical Protection		Class II 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	
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.**

IEC Limit Switches

Metal Housing Plunger Actuator AAM Series

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

AAM Series Limit Switches With Metal Enclosure Selection Chart

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed (m/s [ft/sec])	Min. Actuation Force (N) or Torque (N•m)	Min. Positive Opening Force (N) or Torque (N•m)	Connection Type
AAM2F11Z11	$4aua:	PDF	Metal plunger	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	1/2-in NPT cable entry
AAM2F12Z11	$4aub:	PDF	Metal plunger with metal roller	0.3 [0.98]	12N [2.70 lbf]	30N [6.74 lbf]	1/2-in NPT cable entry
AAM7F12Z11	$4auk:	PDF	Metal plunger with metal roller	0.3 [0.98]	12N [2.70 lbf]	30N [6.74 lbf]	5-pin M12 quick-disconnect (bottom)
AAM2T14Z11	$4auc:	PDF	Metal plunger with dust cap	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	1/2-in NPT cable entry
AAM2T35Z11	$4aud:	PDF	One-way horizontal lever with nylon roller	1 [3.28]	7N [1.57 lbf]	24N [5.40 lbf]	1/2-in NPT cable entry
AAM7T35Z11	$4aun:	PDF	One-way horizontal lever with nylon roller	1 3.28]	7N [1.57 lbf]	24N [5.40 lbf]	5-pin M12 quick-disconnect (bottom)

AAM2F11Z11

AAM2F12Z11

AAM2T14Z11

AAM2T35Z11

Housing style

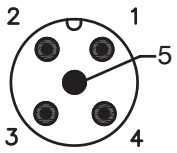
1/2-in NPT cable entry

5-pin M12 quick-disconnect (bottom)

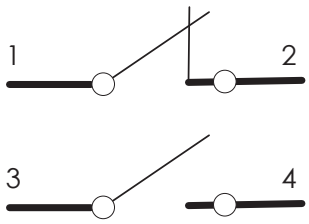
IEC Limit Switches

Metal Housing Plunger Actuator AAM Series

Connector

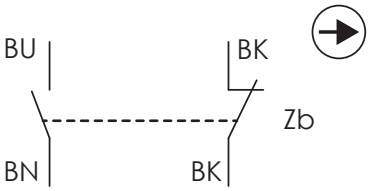


Contact Configuration



NOTE: Pin 5 is housing ground

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



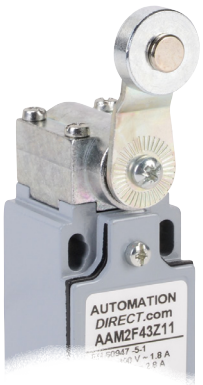
IEC Limit Switches

Metal Housing Side Rotary Lever Actuator AAM Series

- 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

Limit Switches With Metal Enclosure AAM Series Selection Chart

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed (m/s [ft/sec])	Min. Actuation Force (N) or Torque (N•m)	Min. Positive Opening Force (N) or Torque (N•m)	Connection Type
AAM2F43Z11	$4aue:	PDF	Side rotary lever with 18mm metal roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	1/2-in NPT cable entry
AAM7F43Z11	$4auo:	PDF	Side rotary lever with 18mm metal roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)
AAM2F46Z11	$;4auf:	PDF	Side rotary lever inward with 18mm metal roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	1/2-in NPT cable entry
AAM7F46Z11	$4aup:	PDF	Side rotary lever inward with 18mm metal roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)
AAM2F53Z11	$4aug:	PDF	Side rotary adjustable metal lever with 18mm metal roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	1/2-in NPT cable entry
AAM7F53Z11	$4auq:	PDF	Side rotary adjustable metal lever with 18mm metal roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)
AAM2F71Z11	$4auh:	PDF	Side rotary adjustable 3mm stainless steel rod	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	1/2-in NPT cable entry
AAM7F71Z11	$4aus:	PDF	Side rotary adjustable 3mm stainless steel rod	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)



AAM2F43Z11

AAM2F46Z11

AAM2F53Z11

AAM2F71Z11

Housing style

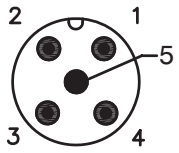
1/2-in NPT cable entry

5-pin M12 quick- disconnect (bottom)

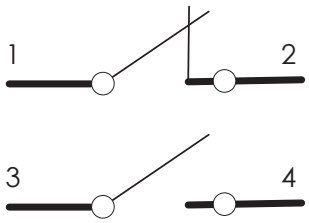
IEC Limit Switches

Metal Housing Side Rotary Lever Actuator AAM Series

Connector

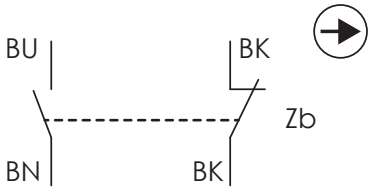


Contact Configuration



NOTE: Pin 5 is housing ground

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



IEC Limit Switches

Metal Housing Stainless Steel Spring Actuator AAM Series

- 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

Limit Switches With Metal Enclosure AAM Series Selection Chart

Part Number	*Price*	*Drawing Link*	*Actuator Type*	*Max. Actuation Speed (m/s [ft/sec])*	*Min. Actuation Force (N) or Torque (N•m)*	*Min. Positive Opening Force (N) or Torque (N•m)*	*Connection Type*
AAM2T93Z11	$-4aui:	PDF	360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	1/2-in NPT cable entry
AAM7T93Z11	$;4aut:	PDF	360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	5-pin M12 quick-disconnect (bottom)

AAM2T93Z11

Housing style

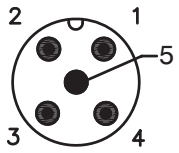
1/2-in NPT cable entry

5-pin M12 quick-disconnect (bottom)

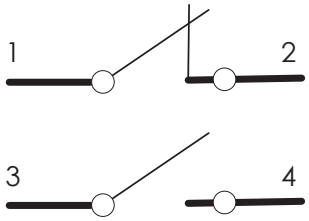
IEC Limit Switches

Metal Housing Stainless Steel Spring Actuator AAM Series

Connector

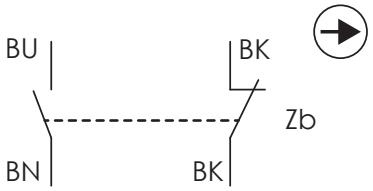


Contact Configuration



NOTE: Pin 5 is housing ground

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



IEC Limit Switches

Plastic Housing Plunger Actuator
AAP Series

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

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

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed (m/s [ft/sec])	Min. Actuation Force (N) or Torque (N•m)	Min. Positive Opening Force (N) or Torque (N•m)	Connection Type
AAP2T10Z11	$;4atz:	PDF	Plastic plunger	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	PG11 threads with 1/2-inch NPT adapter
AAP2T13Z11	$087s:	PDF	Galvanized steel plunger with polyamide plastic roller	0.3 [0.98]	12N [2.70 lbf]	30N [6.74 lbf]	PG11 threads with 1/2-inch NPT adapter
AAP7T13Z11	$;;4at,:	PDF	Galvanized steel plunger with polyamide plastic roller	0.3 [0.98]	12N [2.70 lbf]	30N [6.74 lbf]	5-pin M12 quick-disconnect (bottom)
AAP2T14Z11	$087o:	PDF	Metal plunger with dust cap	0.5 [1.64]	15N [3.37 lbf]	30N [6.74 lbf]	PG11 threads with 1/2-inch NPT adapter
AAP2T35Z11	$087k:	PDF	One-way horizontal lever with polyamide roller	1.0 [3.28]	7N [1.57 lbf]	24N [5.40 lbf]	PG11 threads with 1/2-inch NPT adapter
AAP7T35Z11	$4au1:	PDF	One-way horizontal lever with polyamide roller	1.0 [3.28]	7N [1.57 lbf]	24N [5.40 lbf]	5-pin M12 quick-disconnect (bottom)

AAP7T10Z11

AAP7T13Z11

AAP7T14Z11

AAP7T35Z11

Housing style

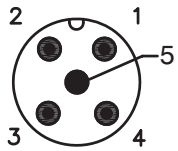
PG11 threads with 1/2-inch NPT adapter

5-pin M12 quick- disconnect (bottom)

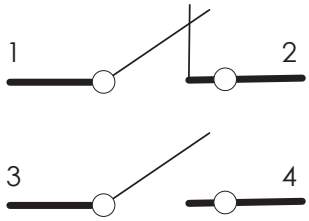
IEC Limit Switches

Plastic Housing Plunger Actuator AAP Series

Connector

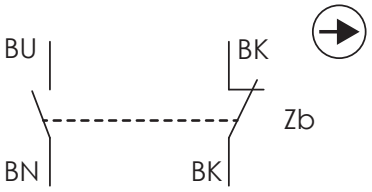


Contact Configuration



NOTE: Pin 5 is housing ground

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



IEC Limit Switches

Plastic Housing Side Rotary Lever Actuator AAP Series

- 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" NPT adapter or 5-pin M12 quick-disconnect

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

Part Number	Price	Drawing Link	Actuator Type	Max. Actuation Speed (m/s [ft/sec])	Min. Actuation Force (N) or Torque (N•m)	Min. Positive Opening Force (N) or Torque (N•m)	Connection Type
AAP2T41Z11	$087z:	PDF	Side rotary lever with polyamide roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	PG11 threads with a 1/2-inch NPT adapter
AAP7T41Z11	$4au2:	PDF	Side rotary lever with polyamide roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)
AAP2T42Z11	$;;4at]:	PDF	Side rotary lever with 50mm rubber roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	PG11 threads with a 1/2-inch NPT adapter
AAP2T45Z11	$;;4at[:	PDF	Side rotary lever inward with 18mm nylon roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	PG11 threads with a 1/2-inch NPT adapter
AAP2T51Z11	$087v:	PDF	Side rotary adjustable metal lever with polyamide roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	PG11 threads with a 1/2-inch NPT adapter
AAP7T51Z11	$4au5:	PDF	Side rotary adjustable metal lever with polyamide roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)
AAP2T5100Z11	$;4at_:	PDF	Side rotary 2mm step adjustable lever with 18mm nylon roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	PG11 threads with a 1/2-inch NPT adapter
AAP7T5100Z11	$4au6:	PDF	Side rotary 2mm step adjustable lever with 18mm nylon roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)
AAP2T5200Z11	$;4at#:	PDF	Side rotary adjustable lever with 50mm rubber roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	PG11 threads with a 1/2-inch NPT adapter
AAP7T5200Z11	$4au7:	PDF	Side rotary adjustable lever with 50mm rubber roller	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)
AAP2T71Z11	$080o:	PDF	Side rotary adjustable 3mm stainless steel rod	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	PG11 threads with a 1/2-inch NPT adapter
AAP7T71Z11	$4au8:	PDF	Side rotary adjustable 3mm stainless steel rod	1.5 [4.92]	0.10 N•m [0.07 lb•ft]	0.32 N•m [0.24 lb•ft]	5-pin M12 quick-disconnect (bottom)

IEC Limit Switches

Plastic Housing Side Rotary Lever Actuator AAP Series

AAP7T41Z11

AAP7T45Z11

AAP7T51Z11

AAP7T5100Z11

AAP7T5200Z11

AAP7T71Z11

Housing style

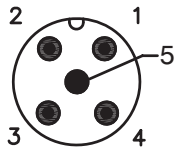
PG11 threads with
1/2-inch NPT adapter

5-pin M12 quick-disconnect
(bottom)

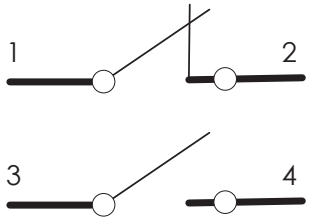
IEC Limit Switches

Plastic Housing Side Rotary Lever Actuator AAP Series

Connector

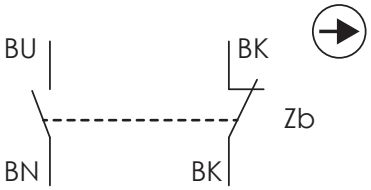


Contact Configuration



NOTE: Pin 5 is housing ground

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



IEC Limit Switches

Plastic Housing Stainless Steel Spring Actuator AAP Series

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

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

Part Number	*Price*		*Actuator Type*	*Max. Actuation Speed (m/s [ft/sec])*	*Min. Actuation Force (N) or Torque (N•m)*	*Min. Positive Opening Force (N) or Torque (N•m)*	*Connection Type*
AAP2T93Z11	$;;4at!:		360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	PG11 threads with a 1/2-inch NPT adapter
AAP7T93Z11	$4au9:		360 degree stainless steel spring	1 [3.28]	0.12 N•m [0.09 lb•ft]	—	5-pin M12 quick-disconnect (bottom)

AAP7T93Z11

Housing style

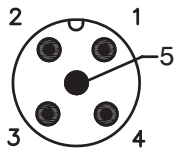
PG11 threads with 1/2-inch NPT adapter

5-pin M12 quick-disconnect (bottom)

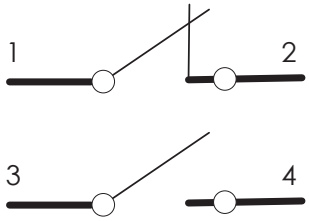
IEC Limit Switches

Plastic Housing Stainless Steel Spring Actuator AAP Series

Connector

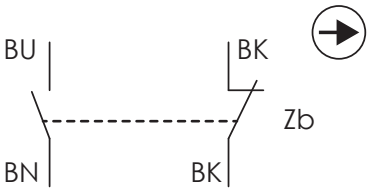


Contact Configuration



NOTE: Pin 5 is housing ground

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



IEC Limit Switches Specifications

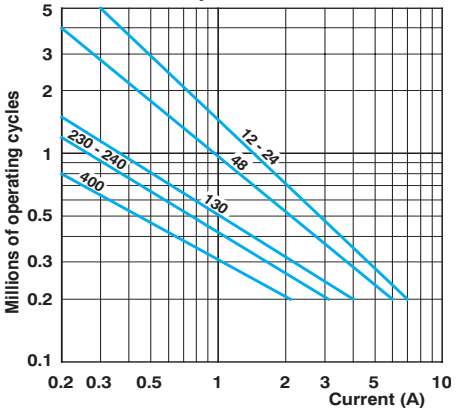
IEC Limit Switches Specifications				
Type		***Plastic***		***Metal***
Environmental				
Degree of Protection		IEC IP65		IEC IP66
Temperature Range [1]		Stocking: -30 to 80°C [-22 to 176° F] Working: -25 to 70°C [-13 to 158°F]		Stocking: -30 to 80°C [-22 to 176°F] Working: -10 to 70°C [14 to 158°F];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

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

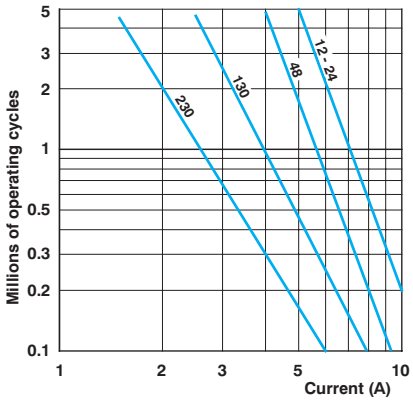
Limit Switches Supplemental

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

AC-15 Snap Action



AC-15 Slow Action



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

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.

Limit switch types

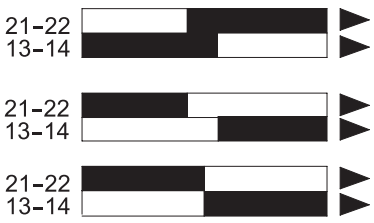
Snap-action contact: A contact element in which the contact motion is independent of the speed of the actuator. This feature ensures reliable electrical performance even in applications involving very slow moving actuators.

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

Terminal identification (IEC)

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

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



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

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

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

= Contact open

= Contact closed

Bar Chart Examples
(cam angle is 30 degrees)

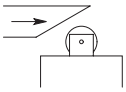
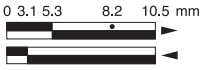


Diagram in millimeters/cam travel



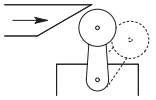
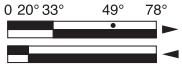


Diagram in degrees/lever rotation



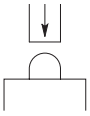
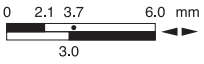


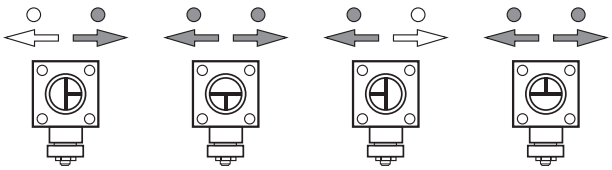
Diagram in millimeters/plunger trave



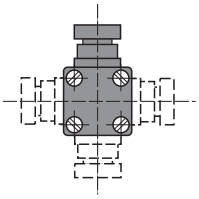
Changeable working heads (E42, E52, E71)

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

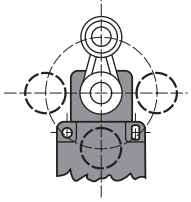
To change position, push in and twist until it locks into place



Positioning - 90º each way

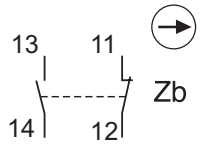


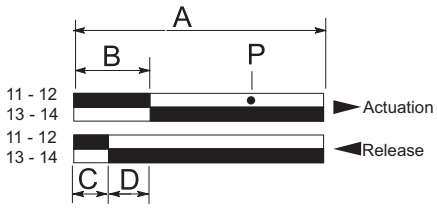
Adjustable lever from 0-360º (6º each increment)



Contact Displacement Values

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





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

B = Tripping travel of both contacts on actuation

C = Tripping travel of both contacts on release

D = Differential travel (between actuation and release)

P = Point from which positive opening is assured during actuation

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

Contact Displacement Values tables continued on next page

Achieve™ IEC Limit Switches Bar Charts

Contacts Configuration and Bar Charts

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

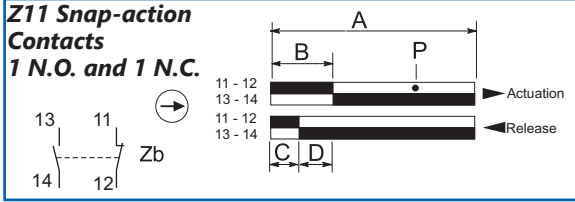
B = Tripping travel of both contacts on actuation

C = Tripping travel of both contacts on release

D = Differential travel (between actuation and release)

P = Point from which positive opening is assured during actuation

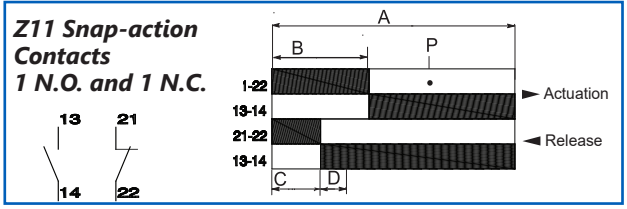
Z11 Snap-action Contacts 1 N.O. and 1 N.C.



Contact Displacement Values

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

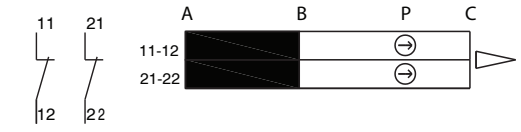
Z11 Snap-action Contacts 1 N.O. and 1 N.C.



Contact Displacement Values

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

J02 Snap-action Contacts 2 N.C.



Contact Displacement Values

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

Contact Displacement Values (continued)

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

B = Tripping travel of the N.C. contact

C = Tripping travel of the N.O. contact

D = Differential travel (between actuation and release)

P = Point from which positive opening is assured during actuation

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

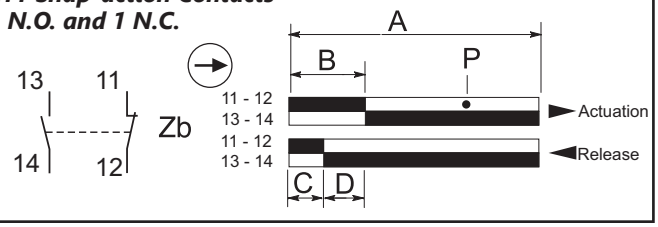
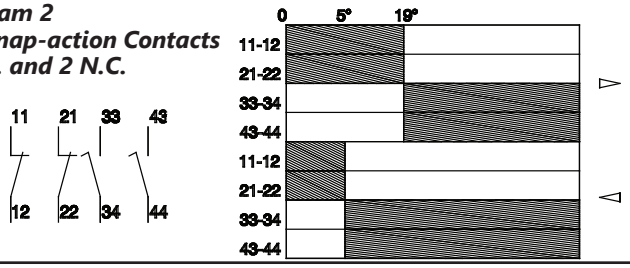


Diagram 2
Z22 Snap-action Contacts
2 N.O. and 2 N.C.



Contact Displacement Values

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