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Design	Miniature format	Compact format, CENELEC EN50047	
	Metal, pre-cabled	Plastic, 1 cable entry	Plastic, 2 cable entries



Enclosure	Metal		Plastic, double insulated
Modularity	Head, body and connection modularity		Head, body and cable entry modularity
Conformity/Certifications	UL, CSA, CCC, GOST		CENELEC EN 50047 UL, CSA, CCC, GOST
Body dimensions (w x h x d) in inches (mm)	1.2 x 2 x 0.6 (30 x 50 x 16)		1.2 x 2.6 x 1.2 (31 x 65 x 30)
Head	Linear movement (plunger) Rotary movement (lever) Rotary movement, multidirectional Same heads for ranges XCMD, XCKD, XCKP and XCKT		2.3 x 2 x 1.2 (58 x 51 x 30)
Contact blocks			
2 electrically separate contacts	snap action with positive opening operation		•
	slow break with positive opening operation		•
2 same polarity contacts	snap action		–
	slow break		–
3 electrically separate contacts	snap action with positive opening operation		•
	slow break with positive opening operation		•
4 electrically separate contacts	snap action with positive opening operation		•
	slow break with positive opening operation		–
4 contacts (2 x 2 same polarity contacts)	snap action		–
Degree of protection IP/IK	IP 66, IP 67, IP 68, IK 06		IP 66, IP 67, IK 04
Operating temperature	– 4°F to + 158°F (– 20°C to + 70°C)		
Connection	Screw terminals	–	
	Pre-cabled	1 entry for ISO M16 or M20, Pg 11, Pg 13.5 cable gland or 1/2" NPT, PF 1/2	
	Connector	2 entries for ISO M16 or Pg 11 cable gland or 1/2" NPT (using adapter)	
Type catalog number	XCMD		XCKP
Pages	6/14		6/34 and 6/38

Compact format, CENELEC EN50047		Compact format, with reset	
Metal, 1 cable entry	Plastic, 1 cable entry	Plastic, 2 cable entries	Metal, 1 cable entry



Metal	Plastic, double insulated		Metal
Head, body and connection modularity	–		
CENELEC EN 50047 UL, CSA, CCC, GOST	UL, CSA, GOST		
1.2 x 2.6 x 1.2 (31 x 65 x 30)	1.2 x 2.6 x 1.2 (31 x 65 x 30)	2.3 x 2 x 1.2 (58 x 51 x 30)	1.2 x 2.6 x 1.2 (31 x 65 x 30)
Linear movement (plunger) Rotary movement (lever) Rotary movement, multidirectional Same heads for ranges XCMD, XCKD, XCKP and XCKT	Linear movement (plunger) Rotary movement (lever)		
●	●	●	●
●	●	●	●
–	–	–	–
–	–	–	–
●	–	–	–
●	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
IP 66, IP 67, IK 06	IP 66, IP 67, IK 04 and IK06 (for XCDR)		
- 4°F to + 158°F (- 20°C to + 70°C)			
1 entry for ISO M16 or M20, Pg 11, Pg 13.5 cable gland or 1/2" NPT, PF 1/2	1 entry for ISO M20 or Pg 13.5 cable gland or 1/2" NPT	2 entries for ISO M16 or Pg 11 cable gland or 1/2" NPT (using adapter)	1 entry for ISO M20 or Pg 13.5 cable gland or 1/2" NPT
–			
M12	–		
XCKD	XCPR	XCTR	XCDR
6/40 and 6/44	6/56	6/60	6/58

Limit switches

OsiSense® XC Standard

Design	“Classic” format		EN 50041 format	Industrial EN50041 format
	Metal, 3 cable entries	Metal, 1 cable entry	Plastic, 1 cable entry	Metal, 1 cable entry or connector



Enclosure	Metal		Plastic, double insulated	Metal
Modularity	Head, body and operator modularity			
Conformity/Certifications	UL, CSA, CCC (XCKM), GOST		CENELEC EN 50041 UL, CSA, CCC, GOST	
Body dimensions (w x h x d) in inches (mm)	2.5 x 2.5 x 1.2 (63 x 64 x 30)	2 x 2.8 x 1.2 (52 x 72 x 30)	1.6 x 2.9 x 1.4 (40 x 72.5 x 36)	1.6 x 3 x 1.7 (40 x 77 x 44) 1.7 x 3.3 x 1.4 (42.5 x 84 x 36)
Head	Linear movement (plunger) Rotary movement (lever) Rotary movement, multidirectional			
Contact blocks	2 electrically separate contacts		•	•
	snap action with positive opening operation slow break with positive opening operation		•	•
2 same polarity contacts	snap action		—	•
	slow break		—	—
3 electrically separate contacts	snap action with positive opening operation		•	•
	slow break with positive opening operation		•	•
4 electrically separate contacts	snap action with positive opening operation		—	—
	slow break with positive opening operation		—	—
4 contacts (2 x 2 same polarity contacts)	snap action		•	•
Degree of protection IP/IK	IP 66, IK 06		IP 65, IK 03	IP 66, IK 07
Operating temperature	- 4°F to + 158°F (- 20°C to + 70°C)			- 4°F to + 158°F (- 20°C to + 70°C) - 40°F to + 248°F (- 40°C or + 120°C) depending on model
Connection	Screw terminals (entry for cable gland)		3 tapped entries for ISO M20 or Pg 11 cable gland, or 1/2" NPT with adapter	1 entry tapped Pg 11 incorporating cable gland or 1 entry tapped 1/2" NPT
	Connector		1 entry for ISO M20 or Pg 13.5 cable gland	1 entry for ISO M20 or Pg 13.5 cable gland or 1/2" NPT
Type catalog number	XCKM		XCKL	XCKS
Pages	6/76		6/76	6/92

Limit switches

OsiSense XC Basic

Miniature format	Compact format EN 50047		Compact format, with reset knob	
Plastic, pre-cabled	Plastic, 1 cable entry	Plastic, 2 cable entries	Plastic, 1 cable entry	Plastic, 2 cable entries



Plastic, double insulated	Plastic, double insulated			
—				
UL, CSA, CCC, GOST	CENELEC EN 50047 UL, CSA, CCC, GOST		UL, CSA, CCC, GOST	
1.2 x 2 x 0.6 (30 x 50 x 16)	1.2 x 2.6 x 1.2 (31 x 65 x 30)	2.3 x 2 x 1.2 (59 x 51 x 30)	1.2 x 2.6 x 1.2 (31 x 65 x 30)	2.3 x 2 x 1.2 (59 x 51 x 30)
Linear movement (plunger) Rotary movement (lever) Rotary movement, multidirectional				
●	●	●	●	●
—	●	●	●	●
—	—	—	—	—
—	—	●	—	●
—	●	—	●	—
—	●	—	●	—
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
IP 65, IK 04				
- 4°F to + 158°F (- 20°C to + 70°C)				
—	1 entry for ISO M20 or Pg 11 cable gland Other cable entries: ISO M16 x 1.5	2 entries for ISO M16 or Pg 11 cable gland or 1/2" NPT (using adapter)	1 entry for ISO M20 or Pg 11 cable gland Other cable entries: ISO M16 x 1.5	2 entries for ISO M16 or Pg 11 cable gland or 1/2" NPT (using adapter)
Ø 7.5 PvR, CEI, halogen free, depending on model	—			
XCMN	XCKN	XCNT	XCNR	XCNTR
6/30	6/64	6/66	6/72	6/72

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Design/Applications	Very severe material handling applications	For hoisting and material handling applications (XCR); for conveyor belt shift monitoring (XCRT)	For hoisting and material handling applications	Subminiature format and microswitch. Applications requiring high precision and a low operating force
	Metal, 3 cable entries	Metal or polyester, 1 cable entry	Metal, 3 cable entries	Plastic, pre-cabled



Enclosure	Metal	Metal or polyester	Metal	Polyester
Features	—	—	—	—
Conformity/Certifications	CSA, GOST	CSA (XCR) CCC (XCR), GOST	—	CE, UL
Body dimensions (w x h x d) in inches (mm)	3 x 3.3 1.7 (77 x 83 x 44)	3.3 x 3.7 x 3 (85 x 95 x 75)	4.6 x 3 x 2.3 (118 x 77 x 59)	Depending on type
Head	Linear movement (plunger)	Rotary movement (lever)		—
Contact blocks	2 electrically separate contacts			
	snap action with positive opening operation	—	—	—
	slow break with positive opening operation	•	—	—
	2 same polarity contacts			
	snap action	—	—	•
	slow break	•	—	—
	3 electrically separate contacts			
	snap action with positive opening operation	—	—	—
	slow break with positive opening operation	—	—	—
	4 electrically separate contacts			
	snap action with positive opening operation	—	•	—
	slow break with positive opening operation	—	•	—
	4 contacts (2 x 2 same polarity contacts), snap action	—	•	—
Degree of protection IP/IK	IP 65	IP54, IP54S or IP 65 depending on model	IP 66, IP 66S	IP 67 or IP 40 depending on model IP 00 (tags)
Operating temperature	- 4°F to + 158°F (- 20°C to + 70°C)			
Connection				
Screw terminals (entry for cable gland)	3 tapped entries for Pg 13.5 cable gland	1 tapped entry for Pg 13.5 cable gland	3 tapped entries for Pg 13.5 cable gland or tapped M20 x 1.5	Tag connections or pre-wired depending on model
Pre-cabled	—	—	—	—
Connector	—	—	—	—
Type catalog number	XC1AC	XCR XCRT	XCKMR	XEP
Pages	6/130	6/136	6/144	6/146, 6/148, 6/162

Limit switches

Preventa® XCS

Safety limit and safety interlock switches

Safety limit switches and safety interlock switches Preventa XCS							
Standard		With lever or hinge	Actuator operated				Non-contact safety interlocks
Miniature format	Compact format	Compact format	Miniature format	Compact format	Industrial format with or without locking		Rectangular format with solenoid interlocking
							Rectangular or cylindrical format
Metal, pre-cabled	Metal or plastic, 1 cable entry	Plastic, 1 or 2 cable entries	Plastic, pre-cabled	Plastic, 1 or 2 cable entries	Metal, 1 cable entry		Metal, 2 cable entries or plastic, 1 cable entry
					Without locking	With locking, manual unlocking	
							Non-contact safety interlock system, pre-cabled or connector



Metal	Metal or plastic	Plastic, double insulated	Plastic, double insulated		Metal		Metal	Plastic, double insulated	Plastic
–		–	–		–		–		–
UL, CSA, GOST		UL, CSA, GOST	UL, CSA	UL, CSA, GOST	UL, CSA, GOST		UL, CSA, GOST		CE, UL, CSA, TÜV, GOST depending on model
1.2 x 2 x 0.6 (30 x 50 x 16)	1.3 x 2.6 x 1.3 (34 x 65 x 34.5)	Depending on type	1.2 x 3.1 x 0.6 (30 x 78 x 15)	1.2 x 3.7 x 1.2 (30 x 93 x 30) 2 x 4.5 x 1.2 (52 x 114 x 30)	1.6 x 2.4 x 1.7 (40 x 60 x 44)		3.9 x 5.7 x 1.7 (98 x 146 x 44) 4.3 x 3.7 x 1.3 (110 x 93.5 x 33)		Depending on type
Linear movement (plunger) or rotary movement (lever)		Rotary movement (lever)	Turret head		Turret head		Turret head		–
–		–	–	●	–		–		Depending on model
–		●	●		–		– ●		
–		–	–	●	–		–		
–		●	●		–		– ●		
●		●	–	●	–		–		
●		●	●		●		● –		
–		–	–		–		–		
–		–	–		–		–		
●		–	–		–		–		
IP 66, IP 67 IP 68 (XCS M) IK 06 (XCS M & XCS D) IK 04 (XCSP)		IP 67	IP 67		IP 67		IP 67		
- 13°F to + 158°F (- 25°C to + 70°C)									
XCS P and XCS D: 1 entry for Pg 13.5 or M20 cable gland or 1/2" NPT XCS M: Ø 7.5 cable, PvR		Depending on model: 1 or 2 entries for Pg 13.5 or ISO M20 cable gland or 1/2" NPT	Depending on model: 1 or 2 entries for ISO M16 or Pg 11 cable gland or 1/2" NPT XCS MP: Ø 7.5 cable, PvR		1 entry for ISO M20 or Pg 13.5 cable gland or 1/2" NPT		Depending on model: 1 or 2 entries for Pg 13.5 or ISO M20 cable gland or 1/2" NPT		–
–		–	–		–		–		PVC cable
–		–	–		–		–		Remote M8, remote M12 or integral M12 depending on model
XCSM	XCSP XCSD	XCSPL, XCSPR XCSTL, XCSTR	XCSMP	XCSPA XCSTA	XCSA	XCSB XCSC	XCSE XCSL	XCSTE	XCS DM/C/P/R XCS DM3/4
6/254, 6/258		6/264	6/274, 6/280		6/268		6/282		6/302, 6/314

Limit switches

OsiSense® XC

Variable composition: simplicity through innovation

Principle

Variable composition principle

■ The Miniature design XCMD and Compact design XCKD, XCKP and XCKT ranges benefit from the variable composition concept.

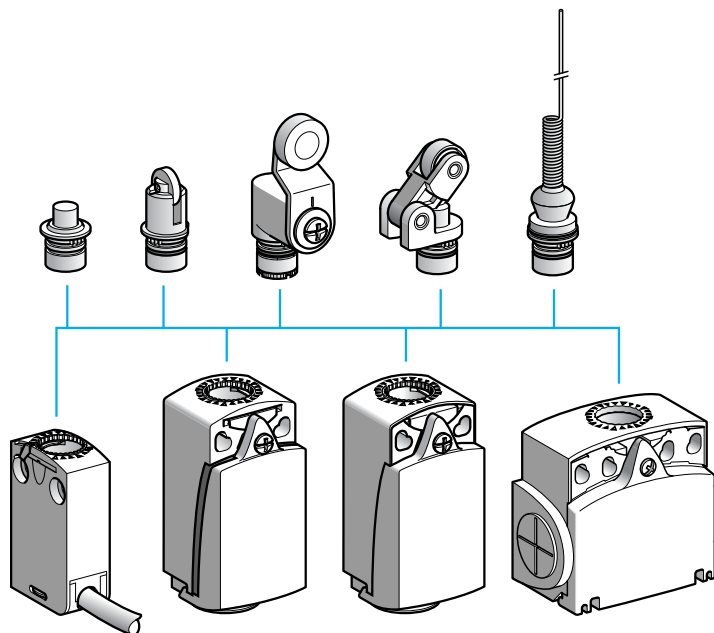
■ A worldwide detection first for improving productivity.

A complete offer for resolving the most commonly encountered detection problems:

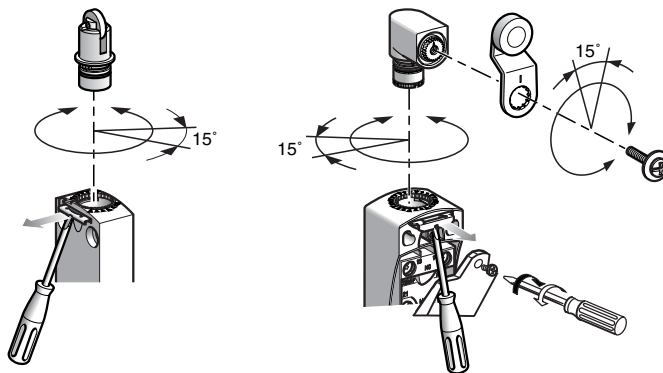
- product selection simplified,
- product availability simplified,
- installation and setup simplified,
- maintenance simplified.

Heads

■ A single metal operating head type for the Miniature design XCMD and Compact design XCKD, XCKP and XCKT ranges.



- Interchanging of heads achieved by simple operation of forked metal latch.
- Adjustable in 2 planes:



All the heads can be adjusted in 15° steps throughout 360°, in relation to the body.

All the levers can be adjusted in 15° steps throughout 360°, in relation to the horizontal axis of the head.

Limit switches

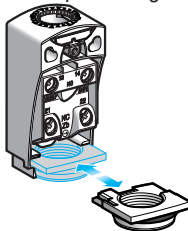
OsiSense® XC

Variable composition: simplicity through innovation

Principle (continued)

Cable entries

- The cable entries for Compact design XCKD and XCKP switches enable:
 - simple cabling due to unrestricted access to contacts,



- simple adaptation to the various worldwide markets:
 - 6 models are available:



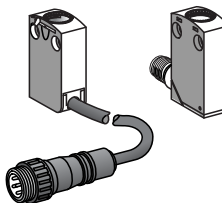
- ISO M16 x 1.5
- Pg 11



- ISO M20 x 1.5
- Pg 13.5
- 1/2" NPT
- PF 1/2 (G 1/2)

Each model is available in metal or plastic, respectively suited to Compact design XCKD and XCKP.

Connection components

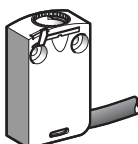
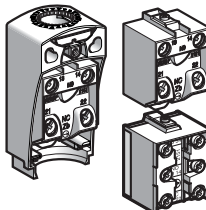


- The miniature XCMD range allows interchanging of these pre-cabled connection components:
 - 1/4 of a turn is all that is required for removing the connection component on XCMD bodies with 2 and 3 contacts,
 - 6 cable lengths are available.

- The miniature XCMD range includes an integral or remote connector solution.

6

Contact block or bodies with contact

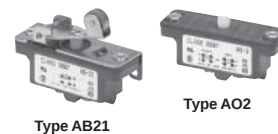


- 2 and 3 snap action and slow break contact blocks, with positive opening operation, are interchangeable between the Compact design XCKD and XCKP and Classic XCKJ, XCKS, XCKM and XCKL ranges.

- For the Miniature design XCMD range, the contacts are an integral part of the body:
 - 2 and 3 snap action and slow break contacts, with positive opening operation, and interchangeable connection component,
 - 4 snap action contacts, with positive opening operation, with monolithic body and connection components.

Industrial snap switches and limit switches without enclosures

Industrial snap switches have been incorporated in many Square D® products such as timers, specialty push buttons, foot switches, operating mechanisms, door interlocks, motor control centers, position switches, and many other control products.



- **Recommended actuator**—An adjustable actuator is recommended. If a non-adjustable actuator is used, a resilient type or a mechanical stop should be used to prevent bottoming of button mechanism.
- **Adjustable actuator overtravel**—Minimum recommended overtravel in both trip and reset directions is 0.015 in. (0.38 mm).
- **Non-adjustable actuator total travel**—Maximum differential limit plus 0.030 in. (0.76 mm). Example: 0.076 in. (1.9 mm) for Type AO2.
- **Fully retracted**—from mounting surface, at least 0.139 in. (3.5 mm) for Type AO1 and 0.160 in. (4.0 mm) for Types AO2 and CO3. **Fully engaged**—from mounting surface, at least 0.061 in. (1.5 mm) but not closer than 0.045 in. (1.1 mm).

Quick make and break

Type of operator	Contact arrangement (1)	Type	Type of operator	Contact arrangement (1)	Type	Type of operator	Contact arrangement (1)	Type
Basic Snap Switch	1 N.O. 1 N.C.	AO1	Rigid Roller Lever Type	2 N.O. 2 N.C.	CB31 (RH) (3)	Roller Plunger Type Panel Mounting Non-Oiltight	1 N.O. 1 N.C.	AP321
	1 N.C.	AO1A			CB32 (LH) (3)		AP324 (2)	
	1 N.O.	AO1B			CB41 (3) (without side mtg. bracket)		2 N.O. 2 N.C.	CP321
	1 N.O. 1 N.C.	AO2			CB33 (RH) (4)		CP324 (2)	
	1 N.C.	AO6 (Plug-in)			CB34 (LH) (4)		Operator Only	AP301 (2)
	1 N.C.	AO2A	Rigid Roller Lever Type One Way Roller	1 N.O. 1 N.C.	AB25 (RH)	Roller Plunger Type Panel Mounting Oiltight	1 N.O. 1 N.C.	AP304 (2) (5)
	1 N.O.	AO2B		AB26 (LH)	AP323			
	2 N.O. 2 N.C.	CO3		CB35 (RH)	AP325 (2)			
	2 N.O.	CO6 (Plug-in)		CB36 (LH)	CP323			
		Two Stage 2 N.O. 2 N.C.	CO7	Cabinet Door Type	1 N.O. 1 N.C.	AC1		2 N.O. 2 N.C.
Rigid Roller Lever Type	1 N.O. 1 N.C.	AB21 (RH) (3)		2 N.O. 2 N.C.	CC1		Operator Only	AP303 (5)
		AB22 (LH) (3)		1 N.O. 1 N.C.	AP221			AP305 (2) (5)
		AB41 (3) (without side mtg. bracket)	Plunger Type Panel Mounting	2 N.O. 2 N.C.	CP221	Mushroom Button Type Panel Mounting	1 N.O. 1 N.C.	AP222
		AB23 (RH) (4)		Operator Only	AP201 (5)		2 N.O. 2 N.C.	CP222
		AB24 (LH) (4)					Operator Only	AP202 (5)

- (1) Single-pole snap switches that contain two double-break contact elements (1 N.O. and 1 N.C.) must be used on circuits of the same polarity. Two-pole snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O. and 1 N.C.) that must be used on circuits of the same polarity.
- (2) Roller turned 90° from standard (perpendicular to mounting holes).
- (3) With 0.22 in. (5.6 mm) width roller.
- (4) With 0.47 in. (12.0 mm) width roller.
- (5) For use with Type AO and CO basic switches.

6

Maximum current ratings for control contacts—all types

Switch type	Contacts	Direct opening contacts meet IEC 60947-5-1 requirements?	Voltage	AC—50 or 60 Hz				Resistive 75% power factor	Voltage	DC		AC or DC
				Inductive 35% power factor						Inductive and resistive		
				Make		Break				Make and break Amperes	Make and break Amperes	
				A	VA	A	VA					
AO1, AC	SPDT Form Z SPST (1) Form X or Y	No	120	40	4800	15	1800	15	125	0.5	0.25	15
			240	20	4800	10	2400	10	250	0.25	0.1	15
			480	10	4800	6	2880	6	600	0.05	—	15
			600	8	4800	5	3000	5	—	—	—	15
AW, AO2 and AO6, AB, AP	SPDT Form Z SPST (1) Form X or Y	No	120	40	4800	15	1800	15	125	2.0	0.5	15
			240	20	4800	10	2400	10	250	0.5	0.2	15
			480	10	4800	6	2880	6	600	0.1	0.02	15
			600	8	4800	5	3000	5	—	—	—	15
AW, CO3 and CO6, CB, CC, CP	DPDT Form ZZ DPST Form AA or BB	No	120	30	3600	3	360	3	125	1.0	0.2	10
			240	15	3600	1.5	360	1.5	250	0.3	0.1	10
			480	7.5	3600	0.75	360	0.75	600	0.1	—	10
			600	6	3600	0.6	360	0.6	—	—	—	10

Acceptable wire size 14–22 AWG
Recommended terminal clamp torque 6–9 lb-in (0.7–1 N·m)



File E78403
CCN NKCR2



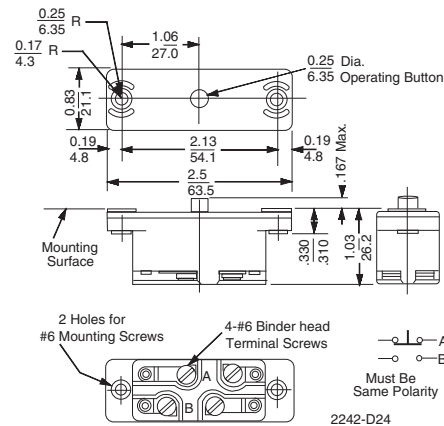
File LR25490
Class 3211-03



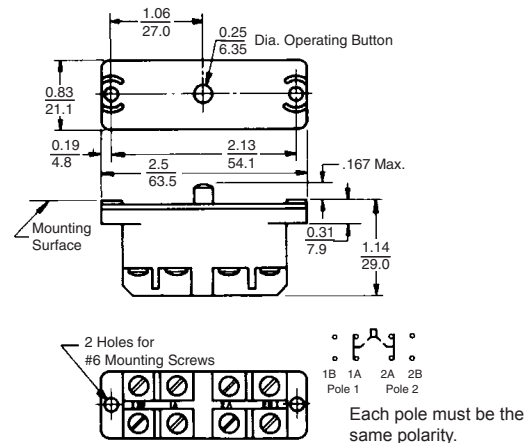
Marking

Approximate dimensions and operating data, Types AO, CO, AP, and CP

Class 9007 Type AO, single-pole snap switch



Class 9007 Type CO, two-pole snap switch



Operating data, in. (mm)

	AO1, 1A, 1B	AO2, 2A, 2B
Pre-travel	0.057–0.074 (1.4–1.8)	0.057–0.074 (1.4–1.8)
Differential	0.015–0.025 (0.6–0.6)	0.035–0.046 (0.9–1.16)
Total travel	0.103–0.125 (2.6–3.2)	0.103–0.125 (2.6–3.2)
Operating force	7–11 oz (0.05–0.08 N)	10–14 oz (0.07–0.1 N)

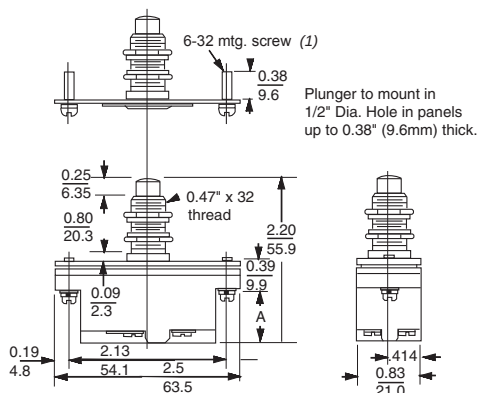
Operating data, in. (mm)

	CO3	C07
Pre-travel 1st stage	0.057–0.074 (1.4–1.8)	0.035–0.060 (0.9–1.5)
Pre-travel 2nd stage	—	0.060–0.085* (1.5–2.1)
Differential	0.025–0.046 (0.6–1.16)	0.010–0.020 (0.25–0.50)
Total travel	0.103–0.125 (2.6–3.2)	—
Operating force	7–12 oz (0.05–0.084 N)	7–12 oz (0.05–0.084 N)

(1) Separation between first and second stage trip points is 0.020–0.025 (0.5–0.6).

Note: Shipping weight of Type AO and CO is 0.25 lb (0.11 kg).

Type AP201, 221, and CP221



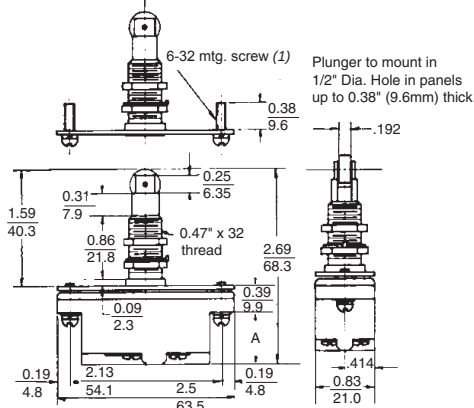
Note: Type AP221 shown.

Operating data

	AP221	CP221
Dimension A	0.70 (17.8)	0.80 (20.3)
Pretravel	0.070–0.089 (1.8–2.2)	0.070–0.089 (1.8–2.2)
Differential	0.035–0.046 (0.9–1.2)	0.025–0.046 (0.9–1.2)
Overtravel	0.161–0.180 (4.1–4.6)	0.161–0.180 (4.1–4.6)
Total travel	0.231–0.269 (5.8–6.8)	0.231–0.269 (5.8–6.8)
Operating force	10–14 oz (0.07–0.1 N)	7–12 oz (0.05–0.08 N)

Note: Shipping weight 0.25 lb (0.11 kg).

Type AP301, 303, 304, 305, 321, 323, 324, 325, and CP321, 323, 324, 325



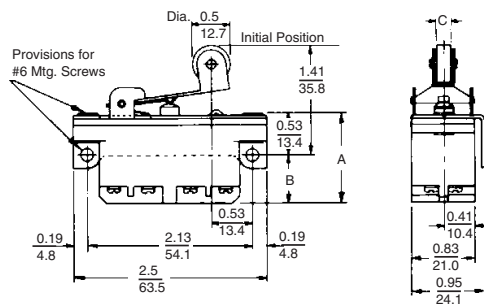
Note: Type AP321 shown.

Operating data

	AP321, 324	AP323, 325	CP321, 324	CP323, 325
Dimension A	0.70 (17.8)	0.70 (17.8)	0.80 (20.3)	0.80 (20.3)
Pretravel	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)
Differential	0.035–0.046 (0.9–1.2)	0.035–0.046 (0.9–1.2)	0.025–0.046 (0.9–1.2)	0.035–0.046 (0.9–1.2)
Total travel	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)
Operating force max.	20 oz (0.14 N)	28 oz (0.2 N)	26 oz (0.18 N)	28 oz (0.2 N)

Approximate dimensions and operating data, Types AB, AC, and CC

Types AB21 through 24 and CB31 through 34



Note: Type CB31 RH mounting shown.
Type AB41 and CB41 same as above except without side mounting plates.

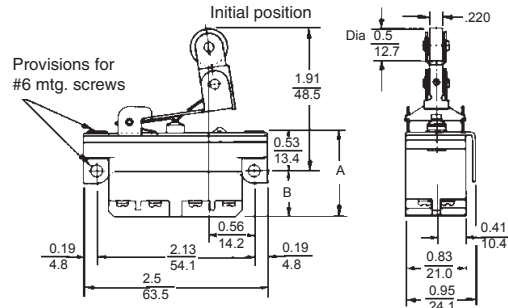
Type	Dimension		
	A	B	C
AB21, 22	1.03 (26.2)	0.5 (12.7)	0.22 (5.6)
AB23, 24	1.03 (26.2)	0.5 (12.7)	0.47 (12.0)
AB41	1.03 (26.2)	—	0.22 (5.6)
CB31, 32	1.13 (28.7)	0.59 (15.0)	0.22 (5.6)
CB33, 34	1.13 (28.7)	0.59 (15.0)	0.47 (12.0)
CB41	1.13 (28.7)	—	0.22 (5.6)

Operating data

Pre-travel	0.16 (4.5)
Differential	0.08 (2.0)
Overtravel	0.06 (1.5)
Total travel	0.22 (5.6)
Operating force	8 oz (0.23 kg)

Note: Shipping weight 0.25 lb (0.11 kg).

Types AB25, 26 and CB35, 36



Note: Type CB35 mounting shown.

Type	Dimension		
	A	B	C
AB25, 26	1.03 (26.2)	0.5 (12.7)	0.22 (5.6)
CB35, 36	1.13 (28.7)	0.59 (15.0)	0.22 (5.6)

Operating data

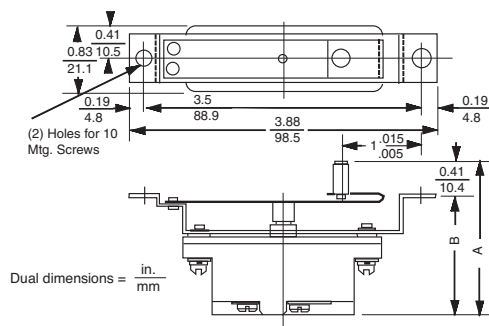
Pre-travel	0.16 (4.5)
Differential	0.08 (2.0)
Overtravel	0.06 (1.5)
Total travel	0.22 (5.6)
Operating force	8 oz (0.23 kg)

Note: Shipping weight 0.25 lb (0.11 kg).

6

Types AC1 and CC1

Dimensions



Note: Type AC1 shown.

Operating data

	AC1	CC1
Dimension A	1.91 (48.5)	2 (50.8)
Dimension B	2 (50.8)	1.59 (40.4)
Pre-travel	0.16 (4.5)	0.16 (4.5)
Differential	0.05 (1.3)	0.07 (1.8)
Overtravel	0.09 (2.3)	0.09 (2.3)
Total travel	0.25 (6.4)	0.25 (6.4)
Operating force	8 oz (0.23 kg)	8 oz (0.23 kg)

Note: Shipping weight 0.25 lb (0.11 kg).

Limit switches

Miniature switches, Class 9007 Types MS and ML



Shown with standard bottom entrance cable



Shown with 4-pin micro-connector



File E78403
NKCR



File LR 25490
Class 3211 03



Marking

Description

Mini-Switch (MS) miniature switches meet the need for very small, enclosed switches with environmental sealing. A full range of styles are available, including top push plunger, parallel roller plunger, cross roller plunger, rotary lever, and omnidirectional whisker. Factory pre-wiring with industrial grade cable (type SJTO) eliminates the need to remove the cover to wire the switch. Bottom- or side-entrance cable connection is available.

Housings are rugged diecast zinc construction. Excellent sealing is achieved with an epoxy compound encapsulation of the electrical cable connections and switch housing. A fluoroelastomer O-ring seal on the plunger keeps liquids from entering the switch cavity.

Features

The heavy-duty, completely encapsulated miniature MS limit switch is intended for difficult applications such as machine tools, earth moving equipment, and general transportation. Key features include:

- Symmetrical design and top mounting holes for easy gang mounting of several switches for multiple switching
- Epoxy encapsulation sealing the pre-wired heavy duty #18 AWG SJTO cable and protecting against temporary submersion
- Single-pole double-throw (SPDT) Form C or Form Z, 1 N.O. + 1 N.C. contact
- Fine rotary lever adjustment
- Compact diecast zinc housing
- NEMA Type 6P and IP67 rated
- 10 ampere continuous current rating
- Gold contacts for low level logic switching
- Stainless steel rollers
- UL Listed and CSA Certified
- CE Marking
- Standard temperature range: -40 to +220 °F (-40 to +104 °C)

Options

- Gold crosspoint contacts
- Double-break contacts (Type ML only)
- Side-entrance cable or connectors
- Low force (top plunger models only)
- Yellow or gray SJTO cable
- 4- or 5-pin micro-connectors, AC and DC
- #16 AWG SJTO cable
- Tapped 8-32 holes on top of housing

Rotary head

Conventional rotary limit switches have mounting holes in the base or body of the switch. In our rotary design, mounting holes are located in the head also. Cycling and stress forces are transmitted from the shaft in the head directly to the mounting bolts. The strain on the joint between the body and the head is eliminated. The result is a stronger and more rigid mounting, less subject to vibration or a weakness in the joint.

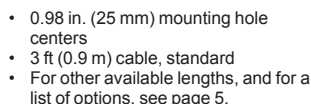
Mounting

Two mounting holes are tapped in the top of each switch (except rotary lever) for #8-32 thread bolts. Switches can be readily mounted to any frame or plate by drilling holes to accommodate #8-32 bolts and switch plungers. Both sides of the housing are counter-bored for surface mounting.

Bulkhead mounted mini-switches

The MS housing has been designed for multiple switching by gang mounting several switches. Roller plunger types are suitable for gang mounting.

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Temperature range	-4 to +220 °F (-20 to +104 °C) The minimum temperatures listed are based on the absence of freezing moisture or water.
Enclosure rating	NEMA Types 1, 2, 4, 6, 6P, 12, 13, IP67
Vibration resistance	10G (75–1200 Hz)
Shock resistance	35G
Cable	#18 AWG SJTO

Rated thermal current	10 A (standard)
Rated insulation voltage	300 Vac and Vdc (standard)
Gold contact switching ratings	0.1 A, 24 Vdc; 0.24 VA

Silver contacts			Gold contacts
ge	Make	Break	100 mA @ 125 Vac
C	60 A	6 A	
C	30 A	3 A	
Amperes continuous			30 mA 28 Vdc
Contact rating: 5 A (voltage), 28 Vdc			

Silver contacts		
Type	Make	Break
C	60 A	6 A
C	30 A	3 A

Amperes, continuous

Contact rating: 5 A (res), 28 Vdc

Top plunger		MS		MS		MS	
MS	ML	MS	ML	MS	ML	MS	ML
		Top plunger 		Bushing mounted—top plunger 		Adjustable top plunger 	
Operating force/torque		80 oz (0.6 N)					
Contact		SPDT					
Form		Form C	Form Z	Form C	Form Z	Form C	Form Z
Contact type		Silver	MS01S0100	ML01S0100	MS06S0100	ML06S0100	MS09S0100
		Gold	MS01G0100	—	MS06G0100	—	MS09G0100
Parallel roller plunger							
		Parallel roller plunger 		Bushing mounted—parallel roller plunger 			
Operating force/torque		80 oz (0.6 N)					
Contact		SPDT					
Form		Form C	Form Z	Form C	Form Z		
Contact type		Silver	MS02S0100	ML02S0100	MS07S0100	ML07S0100	
		Gold	MS02G0100	—	MS07G0100	—	
Cross roller plunger							
		Cross roller plunger 		Bushing mounted—cross roller plunger 			
Operating force/torque		80 oz (0.6 N)					
Contact		SPDT					
Form		Form C	Form Z	Form C	Form Z		
Contact type		Silver	MS03S0100	ML03S0100	MS08S0100	ML08S0100	
		Gold	MS03G0100	—	MS08G0100	—	
Rotary lever, CW and CCW				Omnidirectional—wire whisk (NEMA Types 1, 2, 12, 13 only)			
Operating force/torque		48 oz-in (0.3 N•m)		15 oz-in (0.1 N•m)			
Contact		SPDT					
Form		Form C	Form Z	Form C			
Contact type		Silver	MS04S0100	ML04S0100	MS05S0100		
		Gold	MS04G0100	—	MS05G0100		

Description / functional diagram

Booted devices									
MS		ML		MS		ML			
				Booted top plunger		Booted parallel roller plunger			
Operating force/torque								80 oz (0.6 N)	
Contact								SPDT	
Form				Form C	Form Z	Form C	Form Z		
Contact type				Silver	MS10S0100	ML10S0100	MS12S0100	ML12S0100	
				Gold	MS10G0100	—	MS12G0100	—	MS13G0100



Lever

Lever arm selection

There are many styles of levers to accommodate most industrial applications. The levers are diecast metal. The standard roller levers are available with nylon rollers and are also available with steel rollers. See the tables below. Dimensions are given as in. (mm).

Style 7 levers—0.75 in. (19 mm) diameter, nylon or steel roller

Length		Catalog number 0.25 (6) wide		Catalog number 0.5 (13) wide		Catalog number 0.75 (19) wide		Catalog number 1 (25) wide	
in.	mm	Nylon	Steel	Nylon	Steel	Nylon	Steel	Nylon	Steel
0.875	22.23	7A2N	7A2	7B2N	7B2	7F2N	—	7J2N	—
1.375	34.93	7A3N	—	7B3N	—	7F3N	—	7J3N	—
1.5	38.10	7A1N	7A1	7B1N	—	7F1N	—	7J1N	—
1.75	44.45	7A7N	—	7B7N	—	7F7N	—	7J7N	—
2.00	50.8	7A4N	—	7B4N	—	7F4N	—	7J4N	—

Style 7X levers—0.75 in. (19 mm) diameter, nylon or steel roller

Length		Catalog number 0.25 (6) wide		Catalog number 0.5 (13) wide		Catalog number 0.75 (19) wide		Catalog number 1 (25) wide	
in.	(mm)	Nylon	Steel	Nylon	Steel	Nylon	Steel	Nylon	Steel
.875	22.23	7XA2N	7XA2	7XB2N	7XB2	7XF2N	—	7XJ2N	—
1.375	34.93	7XA3N	—	7XB3N	—	7XF3N	—	7XJ3N	—
1.5	38.10	7XA1N	7XA1	7XB1N	—	7XF1N	—	7XJ1N	—
1.75	44.45	7XA7N	—	7XB7N	—	7XF7N	—	7XJ7N	—
2.00	50.8	7XA4N	—	7XB4N	—	7XF4N	—	7XJ4N	—

Specialty arms and options

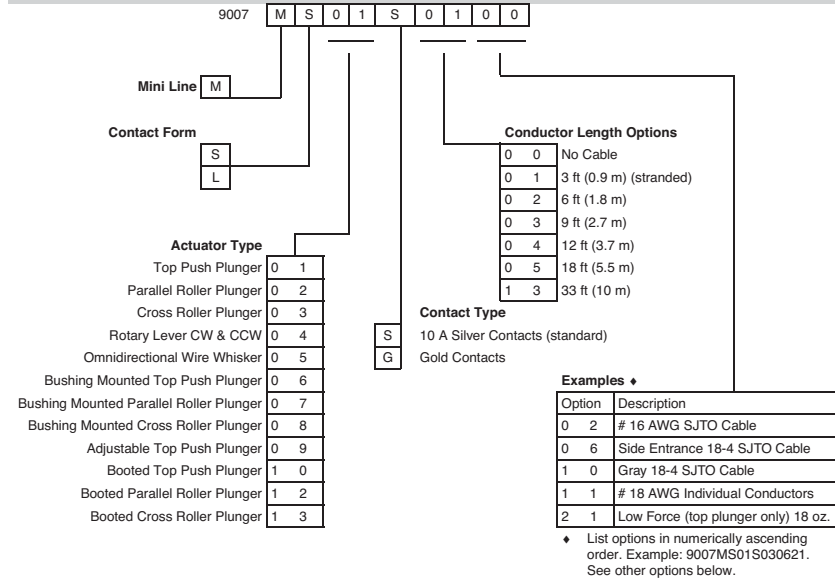
Description	Length	Diameter	Width	Catalog number
Style 7D adjustable length, metal roller	1.38 to 3.38 (35 to 85.8)	0.75 (19)	0.25 (6.35)	7D
Style 7D adjustable length, nylon roller	1.38 to 3.38 (35 to 85.8)	0.75 (19)	0.25 (6.35)	7DN
Style 7S spring nylon rod	6 (152.4)	0.3 (7.6)	—	7S
Style 7N nylon rod	5 (127)	0.3 (7.6)	—	7N
Option				Suffix to add to catalog number
Corrosion proof (option available with nylon rollers only)				S

Lever tightening torque for mounting the lever on the shaft: minimum 17 lb-in (1.9 N•m).



9007MS02 shown with
M12 connector

For Interpretation of the Catalog Number Only



Conductor length	Designator (1)
No cable	00
3 ft (0.9 m)—std.	01
6 ft (1.8 m)	02
9 ft (2.7 m)	03
12 ft (3.7 m)	04
18 ft (5.5 m)	05
33 ft (10 m)	13

MS general options (Does not apply to ML except where noted)	Designator (1)
#16 AWG SJTO cable	02
Side entrance, #18 AWG SJTO cable, or connector 12, 54, 55, 82, 84 (2)	06
Gray #18 AWG SJTO cable	10
#18 AWG individual conductors	11
Male 4-pin mini-connector on 3 ft (0.9 m) or more cable	12
Low force (NEMA Type 1 only) 18 oz.	21
High pre-travel—adds 0.030	30
Male 4-pin micro-connector in housing (DC type) (3) (no cable) Note: DC connectors are rated 3 A, 250 Vac/Vdc.	54
Male 5-pin micro-connector in housing (DC type) (3) (no cable) (ML only) Omit seals in plunger or rotary heads for -40 F/C temperature (NEMA 1). Note: DC connectors are rated 3 A, 250 Vac/Vdc.	55
Tapped holes in top of plunger style housing (MS and ML)	81
Male 4-pin micro-connector in housing (AC type) (no cable)	82
Black 18/5 SJTO cable (ML only)	83
Male 4-pin micro-connector in housing (AC type) (no cable)	84

- (1) Ex: 9007MS01S0100 with a 9 ft (2.7 m) cable becomes 9007MS01S0300. 9007MS01S0100 with side entrance becomes 9007MS01S0106.
- (2) For side entry connectors, include 06, then 12, 54, 55, 82, or 84; otherwise the connector will come from the bottom of the housing. For example: Catalog no. with side entrance connector: 9007MS01S000654. No cable available with 54 and 55. Option 12 is supplied with 3 ft (0.9 m) of cable.

Male plug (face) pin-outs

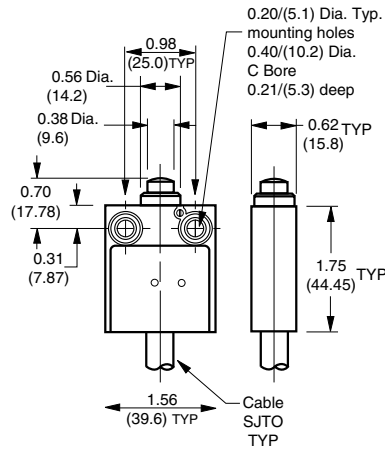
Option 54 (MS only) - DC	Option 55 (ML only) - DC	Option 12 (MS only) - AC or DC (3 Amps)	Option 82 (MS only) - AC	Option 84 (MS only) - AC

DC connectors are rated 3 A, 250 Vac/Vdc.

Dimensions

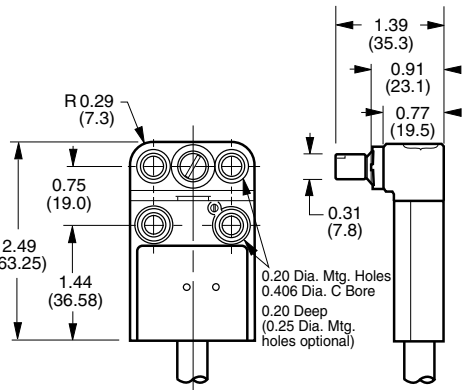
Top push plunger

MS01, ML01



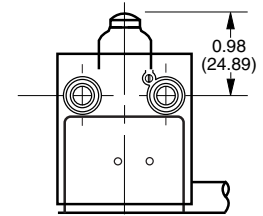
Rotary lever

MS04, ML04



Booted top push plunger with mid-side entry cable

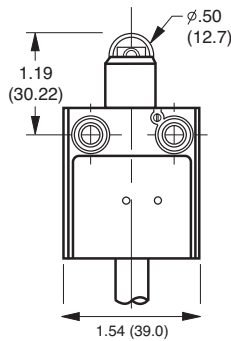
MS10, ML10



Dual dimensions = $\frac{\text{in.}}{\text{mm}}$

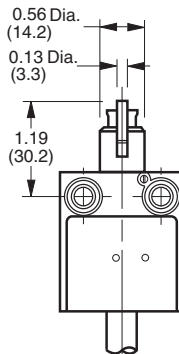
Parallel roller plunger

MS02, ML02



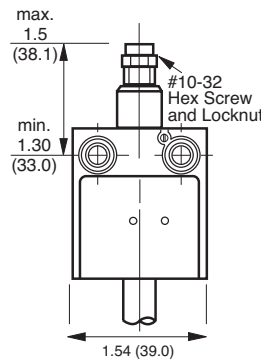
Cross roller plunger

MS03, ML03



Adjustable top push plunger

MS09, ML09

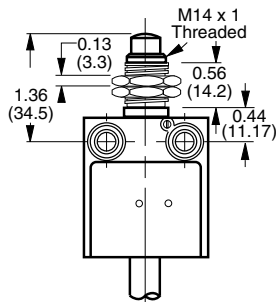


Omnidirectional

MS05, ML05

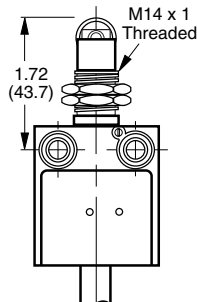
Bushing mounted top push plunger

MS06, ML06



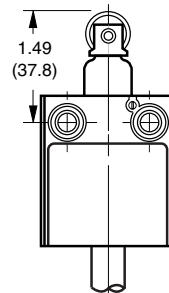
Bushing mounted parallel roller plunger

MS07, ML07



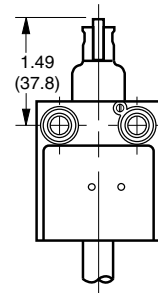
Parallel booted roller plunger

MS12, ML12



Cross-booted roller plunger

MS13, ML13





Lever arm type



Plunger type

Lever arm and plunger types

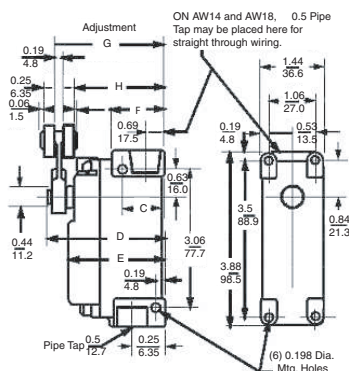
Select switch		Select operator type		
		Lever arm type without lever arm; field selectable CW/CWW operation	Roller plunger type with micrometer adjustment	Push rod plunger type with micrometer adjustment
Mounting	Contacts	Type	Type	Type
Surface mounting plug-in	1 N.O.—1 N.C.	AW16	AW36	AW46
	2 N.O.	AW19 (CW)	—	—
	2 N.C.	AW19 (CCW)	—	—
Surface mounting Nonplug-in standard box	1 N.O.—1 N.C.	AW12	AW32	AW42
	1 N.O.—1 N.C.	AW14	—	—
Surface mounting non-plug-in deep box	2 N.O.—2 N.C.	AW18	AW38	—
	1 N.O.—1 N.C.	AO16	AO36	—
Open type (without box) plug-in	2 N.O.	AW19 (CW)	—	—
	2 N.C.	AW19 (CCW)	—	—
	1 N.O.—1 N.C.	AO12	—	—
Open type (without box) non-plug-in	2 N.O.—2 N.C.	AO18	—	—
	1 N.O.—1 N.C.	AE12	—	—
Flush mounting				

Nominal operating data in. (mm)	Pre-travel	5°	0.09 (2.3)	0.09 (2.3)
	Total-travel	30°	0.25 (6.3) ±0.06 (1.5) Adjustable	0.25 (6.3) ±0.06 (1.5) Adjustable
	Differential	2.5°	0.05 (1.3)	0.05 (1.3)
	Reverse over-travel	25°	—	—
	Operating torque or force	2.75 lb-in (0.31 N•m)	3 lb-in (0.34 N•m)	3 lb-in (0.34 N•m)
	Repeat accuracy	±0.002 (0.05)	±0.001 (0.02)	±0.001 (0.02)
		Linear travel of cam on 1.38 (35) lever arm		

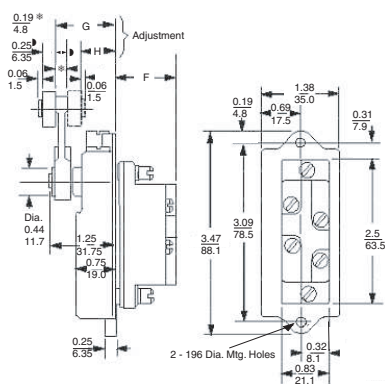
For lever arms, see page 6/?.

Approximate dimensions

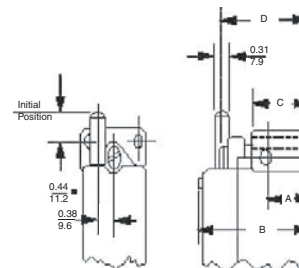
Type AW



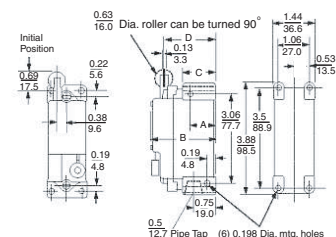
Type AO



Type AW42, 46, 48, and 49



Type AW32, 36, and 38



Type	A	B	C	D	E	F	G	H
AW12			0.31 (7.9)	2.69 (68.3)	2.19 (56)	1.16 (29.4)	2.5–2.56 (63.5–65)	2.06–2.13 (52.3–54)
AW14								
AW16			1.25 (32)	3 (76)	2.5 (63.5)	1.47 (37)	2.81–2.88 (71–73)	2.38–2.44 (60–62)
AW18								
AW19								
AW32	0.31 (7.9)	2.22 (56)	1.16 (29.4)	1.81 (46)				
AW42								
AW36								
AW38								
AW46	1.25 (32)	2.53 (64)	1.47 (37.3)	2.13 (5.4)				
AW48								
AW49								
AO12			—	—	—	1.03 (26)	1.06–1.13 (27–29)	0.63–0.69 (16–17.5)
AO18			—	—	—	1.13 (29)	1.06–1.13 (27–29)	0.63–0.69 (16–17.5)

Limit switches

Class 9007C heavy duty industrial—plug-in body, metal
Standard and compact

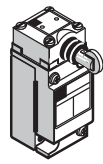
Standard plug-in body type

with 1 cable entry (1)

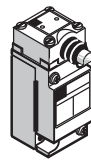
The standard plug-in body types with one cable entry

With head for linear movement

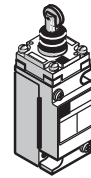
side plunger



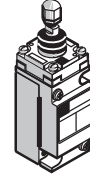
Page 6/?



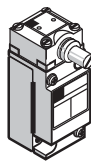
top plunger



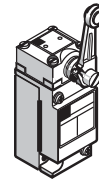
Page 6/?



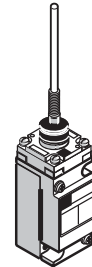
With head for rotary movement (lever)



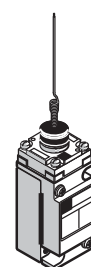
Page 6/?



With head for multi-directional movement



Page 6/?



Compact plug-in body type

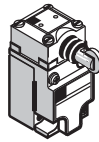
with one cable entry (1)

With head for linear movement

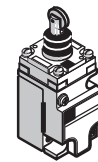
Side plunger



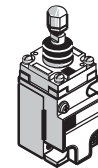
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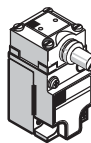
Top plunger



Page 6/?

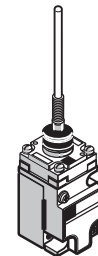


With head for rotary movement (lever)

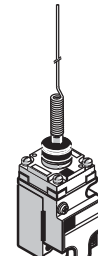


Page 6/?

With head for multi-directional movement



Page 6/?



(1) Factory modifications: see pages 6/? to 6/?

Limit switches

Class 9007C heavy duty industrial—plug-in body, metal
Standard and compact

Environmental specifications

Conforming to standards	Products	NEMA 250, EN 60947-1, EN 60947-5-1, IEC 60947, UL 508, C22-2-14-95, CE conformity documentation
Product certifications		UL, CSA, CE
Protective treatment		Epoxy powder coat (additional protection available)
Ambient air temperature	Operation	-20...+185 °F (-28.9...+85 °C), wider range available
	Storage	-20...+185 °F (-28.9...+85 °C), wider range available
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10...150 Hz, 11 ms)
Shock resistance	Conforming to IEC 60068-2-27	60 gn (9 ms)
Electric shock protection	Conforming to IEC 61140	Class 0
Degree of protection	Conforming to IEC 60529	IP 67
Cable entry or connector (1)	Depending on model	1/2-14 NPT, M20 x 1.5, ISO cable entry, 5-pin mini connector, 4-pin micro connector
Materials	Bodies, heads, levers	Bodies and heads in Zamak zinc alloy, levers and rods in zinc, steel, stainless steel, acetal resin.

(1) A wide range of connectors is available. Contact your local field office.

Contact block specifications

Rated operational specifications hard contacts -AC Voltage	9007CO52 (compact single)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO54 (single pole)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO62 (two pole)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO66 (two pole two stage)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CO68 (two pole neutral position)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
Rated operational specifications hard contacts -DC Voltage	9007CO52 (compact single)	NEMA Q600 (Ue = 600 V, Ie = 0.1 A); Ithe = 2.5 A
	9007CO54 (single pole)	NEMA Q600 (Ue = 600 V, Ie = 0.1 A); Ithe = 2.5 A
	9007CO62 (two pole)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CO66 (two pole two stage)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CO68 (two pole neutral position)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
Rated insulation voltage		600 V
Rated impulse withstand voltage		2,500 Vac for 1 minute for CE; 2,200 Vac for 1 minute for UL; and 2,640 Vac for 1 s for CSA
Positive opening	Form Y1561	☞
Short circuit protection		10 A. Bussmann Class CC KTK-R-10 fuse non-time-delay (not supplied)
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires
Maximum actuation speed		15.2 mpm / 27.4 mpm (50 fpm / 90 fpm) with 45 degree cam angle, levers only
Electrical durability		1 million operating cycles

Types of contact elements

Example: 9007C54 single-pole limit switch, Form Z, same polarity

6

IEC 60947-5-1			NEMA			JIS		
Form	Symbol	Description	Form	Symbol	Description	Form	Symbol	Description
A		Single break	A		—	3		—
X		—			—			Double break
B		Single break	B		—	2		—
Y		—			—			Double break
C		—	C		—	1		Single break
Za		Same polarity	Z		Same polarity only			Double break
Zb		Electrically separate			—			—

Limit switches

Class 9007C heavy duty industrial—plug-in body, metal
Standard body

Type of head		Side plunger (mounting by the body)			
Standard plug-in body type					
Type of operator		Side roller plunger, spring return, vertical roller (1)	Side push rod plunger, spring return	Side push rod plunger, adjustable (2) spring return	Side push rod plunger, maintained contact
Catalog numbers					
1 N.O. 1 N.C. snap action					
2 N.O. 2 N.C. snap action					
2 N.O. 2 N.C. two-stage snap action					
Weight, kg (lb)		0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation		contact closed contact open			
Specifications (nominal operating data)					
Switch actuation		On end			
Type of actuation					
Pre-travel		2 mm (0.08 in.)			
Pre-travel two stage		3.6 mm (0.14 in.)			
First stage		2 mm (0.08 in.)			
First stage to second stage		0.5 mm (0.02 in.)			
Total travel		6.3 mm (0.25 in.)			
Differential		0.8 mm (0.03 in.)			
Reverse overtravel		—			
Minimum force or torque		1 pole & 2 pole			
		4 lb (17.8 N)			
		7 lb (31.1 N)			
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)		0.03 mm (0.001 in.)			
Cable entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

(1) Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter **H** at the end of the equivalent vertical roller version type.

(2) To lock the nut in the desired position, crimp the slot near the bottom of the nut.

(1) Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter H at the end of the equivalent vertical roller version type.
(2) To lock the nut in the desired position, crimp the slot near the bottom of the nut.

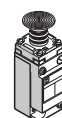
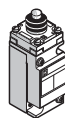
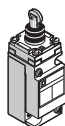
Limit switches

Class 9007C heavy duty industrial—plug-in body, metal
Standard body

Type of head

Top plunger (mounting by the body)

Standard plug-in body type



Type of operator

Top roller plunger
spring return

Top push rod plunger
spring return

Top push rod plunger
adjustable (1)
spring return

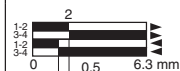
Palm operated
(2)

Catalog numbers

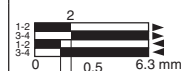
1 N.O. 1 N.C. snap action



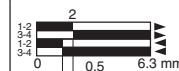
9007C54D



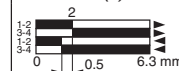
9007C54E



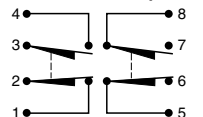
9007C54ED



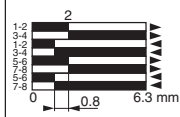
9007C54R (2)



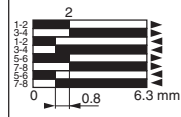
2 N.O. 2 N.C. snap action



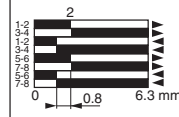
9007C62D



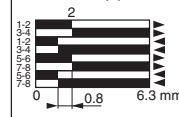
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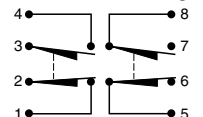
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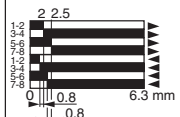
9007C62R (2)



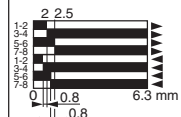
2 N.O. 2 N.C. two stage snap action



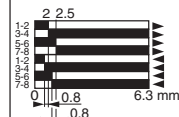
9007C66D



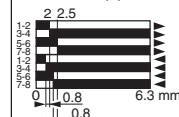
9007C66E



9007C66ED



9007C66R (2)



Weight, kg (lb)

0.568 (1.25)

0.568 (1.25)

0.568 (1.25)

0.568 (1.25)

Contact operation

■ contact closed

□ contact open

Specifications (nominal operating data)

Switch actuation

On end

Type of actuation



Pre-travel

2 mm (0.08 in.)

Pre-travel two stage

First stage

2 mm (0.08 in.)

First stage to second stage

0.3 mm (0.01 in.)

Total travel

6.3 mm (0.25 in.)

Differential

0.5 mm (0.02 in.)

Reverse overtravel

—

Minimum force or torque

1 pole & 2 pole

3 lb (13.3 N)

7 lb (31.1 N)

Terminal wire sizes (cabling/screw clamp)

1 or 2, 12–22 AWG (2.05–0.644 mm²) wires maximum

Repeatability (linear travel of cam)

0.03 mm (0.001 in.)

Cable entry

1/2–14 NPT standard, optional M20 x 1.5 mm for ISO cable entry

(1) To lock the nut in the desired position, crimp the slot near the bottom of the nut.

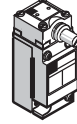
(2) Does not include mushroom button. Must be ordered separately; see below.

Available operators

Description	Diameter in. (mm)	Color	Catalog number	Weight kg (lb)
Mushroom button for palm operated turret head	1.38 (35)	Black	2358C6G3	0.03 (0.06)
		Red	2358C6G2	0.03 (0.06)
		Green	2358C6G6	0.03 (0.06)
		Yellow	2358C6G8	0.03 (0.06)
	2.25 (57.2)	Black	—	—
		Red	2358C22G3	0.05 (0.10)
		Green	2358C22G6	0.05 (0.10)
		Yellow	2358C22G8	0.05 (0.10)

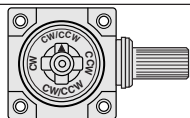
Limit switches

Class 9007C heavy duty industrial—plug-in body, metal
Standard body

Type of head		Rotary (lever arm type) (1)				
Standard plug-in body type						
Type of operator	Standard pre-travel, spring return	Low differential, spring return	Neutral position Standard pre-travel, spring return Low differential, spring return		Light operating torque spring return	Maintained contact
Type of direction	CW & CCW (2)	CW & CCW (2)	CW & CCW	CW & CCW	CW & CCW (2)	CW (trip) CCW (reset)
Catalog numbers						
1 N.O., 1 N.C. snap action						
2 N.O., 2 N.C. snap action						
2 N.O., 2 N.C. snap action Neutral position						
2 N.O., 2 N.C. Two stage snap action						
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)
Contact operation	 contact closed		 contact open			
Specifications (nominal operating data)						
Switch actuation	By 30° cam					
Type of actuation						
Pre-travel	10°	5°	10°	5°	10°	45°
Pre-travel two stage						
First stage	10°	5°	—	—	10°	—
First stage to second stage	2.5°	1.5°	—	—	2.5°	—
Total travel	90°					90°
Differential	4°	2°	4°	2°	4°	—
Reverse overtravel	90°					—
Operating torque/force 1 pole & 2 pole	4 lb-in (0.45 N•m)				25 oz-in (0•18 N•m)	3 lb-in (0.34 N•m)
Terminal wire sizes (cabling/screw clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm²) wires maximum					
Repeatability (linear travel of cam)	0.05 mm (± 0.002 in.)	0.03 mm (± 0.001 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry					

(1) Lever arm type must be ordered separately from pages 6/7 to 6/31.

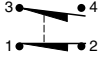
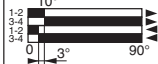
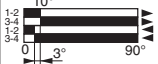
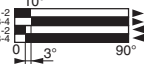
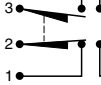
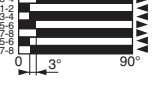
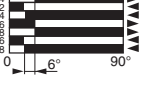
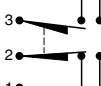
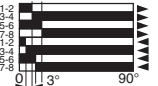
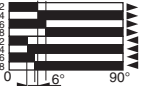
(2) These devices are factory set to operate the contacts in **both** the CW and CCW directions. To order factory converted devices: For CCW only operation, change the 2 at the end of the Type number to 1 (for example, C54B2 becomes C54B1). For CW only operation, delete the 2 at the end of the Type number (for example, C54B2 becomes C54B).



Mode of operation of the lever arm is easily convertible to clockwise or both. Simply pull out and rotate the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW.

Limit switches

Class 9007C heavy duty industrial—plug-in body, metal
Standard body

Type of head		Flexible operator (wobble stick)				
Standard plug-in body type						
	Type of operator	Universal (1)	Wobble stick acetal resin extension (1)	Wobble stick wire extension (1)	Wobble stick coil spring extension (1)	Cat whisker
	Catalog numbers					
	1 N.O. 1 N.C. snap action	9007C54JKC	9007C54J	9007C54K	9007C54KC	9007C54L
						
2 N.O. 2 N.C. snap action	9007C62JKC	9007C62J	9007C62K	9007C62KC	9007C62L	
						
2 N.O. 2 N.C. Two stage snap action	9007C66JKC	9007C66J	9007C66K	9007C66KC	9007C66L	
						
Weight, kg (lb)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	0.568 (1.25)	
Contact operation	 contact closed  contact open					
Specifications (nominal operating data)						
Switch actuation	Object from any direction					
Type of actuation						
Pre-travel	10° (any direction)				20°	
Pre-travel two stage	10° (any direction)				20°	
First stage	10° (any direction)				20°	
First stage to second stage	4°				5°	
Total travel	90°					
Differential	3				6°	
Reverse overtravel	—					
Operating torque/force 1 pole & 2 pole	3 lb-in (0.34 N·m)				7 oz-in (0.05 N·m)	
Terminal wire sizes (cabling/screw clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum					
Repeatability (linear travel of cam)	—					
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry					

(1) Wobble stick extensions are available separately for the universal head. See below.

Description	Type of extension	Catalog number	Weight kg (lb)
Wobble stick extensions for the universal head, and as replacements for complete devices	Acetal resin extension	9007WJ	0.01 (0.03)
	Wire extension	9007WK	0.01 (0.02)
	Coil spring extension	9007WKC	0.02 (0.04)

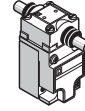
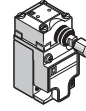
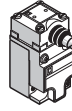
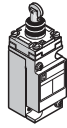
Limit switches

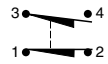
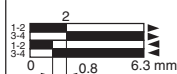
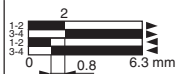
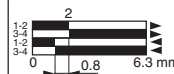
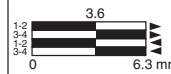
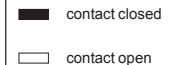
Class 9007C heavy duty industrial—plug-in body, metal
Compact body

Type of head

Side plunger (mounting by the body)

Compact plug-in body type



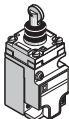
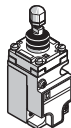
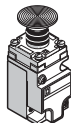
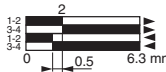
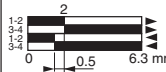
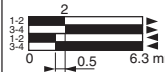
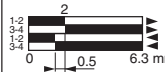
Type of operator	Side roller plunger spring return vertical roller (1)	Side push rod plunger spring return	Side push rod plunger adjustable (2) spring return	Side push rod plunger maintained contact
Catalog numbers				
1 N.O. 1 N.C. snap action 	9007C52F 	9007C52G 	9007C52GD 	9007C52H 
Weight, kg (lb)	0.456 (1.01)	0.445 (0.98)	0.422 (0.93)	0.568 (1.25)
Contact operation				

Specifications (nominal operating data)

Switch actuation	On end			
Type of actuation				
Pre-travel	2 mm (0.08 in.)			3.6 mm (0.14 in.)
Pre-travel two stage	First stage	2 mm (0.08 in.)		—
	First stage to second stage	0.5 mm (0.02 in.)		—
Total travel	6.3 mm (0.25 in.)			6.3 mm (0.25 in.)
Differential	0.8 mm (0.03 in.)			—
Reverse overtravel	—			—
Minimum force or torque	1 pole & 2 pole	4 lb (17.8 N)		7 lb (31.1 N)
Terminal wire sizes (cabling/screw clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)	0.03 mm (0.001 in.)			—
Cable entry	1/2–14 NPT standard, optional M20 x 1.5 mm for ISO cable entry. Prewired options available.			

- (1) Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter H at the end of the equivalent vertical roller version type.
(2) To lock the nut in the desired position, crimp the slot near the bottom of the nut.

Limit switches
Class 9007C heavy duty industrial—plug-in body, metal
Compact body

Type of head		Top plunger (mounting by the body)			
Compact plug-in body type					
Type of operator		Top roller plunger spring return	Top push rod plunger spring return	Top push rod plunger adjustable (1) spring return	Palm operated (2)
Catalog numbers					
1 N.O. 1 N.C. snap action		9007C52D	9007C52E	9007C52ED	9007C52R (2)
					
Weight, kg (lb)		0.169 (0.43)	0.169 (0.43)	0.422 (0.93)	0.568 (1.25)
Contact operation		 contact closed  contact open			
Specifications (nominal operating data)					
Switch actuation		On end			
Type of actuation					
Pre-travel		2 mm (0.08 in.)			
Total travel		6.3 mm (0.25 in.)			
Differential		0.5 mm (0.02 in.)			
Reverse overtravel					
Minimum force or torque 1 pole & 2 pole		3 lb (13.3 N)			
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)		0.03 mm (0.001 in.)			
Cable entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry. Prewired options available.			

(1) To lock the nut in the desired position, crimp the slot near the bottom of the nut.
(2) Does not include mushroom button. Must be ordered separately; see below.

Available operators				
Description	Diameter in. (mm)	Color	Catalog number	Weight kg (lb)
Mushroom button for palm operated turret head	1.38 (35)	Black	2358C6G3	0.03 (0.06)
		Red	2358C6G2	0.03 (0.06)
		Green	2358C6G6	0.03 (0.06)
		Yellow	2358C6G8	0.03 (0.06)
	2.25 (57.2)	Black	—	—
		Red	2358C22G3	0.05 (0.10)
		Green	2358C22G6	0.05 (0.10)
		Yellow	2358C22G8	0.05 (0.10)

Type of head Rotary (lever arm type) (1)

Compact plug-in body type



Type of operator	Standard pre-travel spring return	Low differential spring return	Light operating torque spring return	Maintained contact
Type of direction	CW & CCW (2)	CW & CCW (2)	CW & CCW (2)	CW (trip) CCW (reset)

Catalog numbers

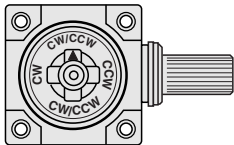
1 N.O. 1 N.C. snap action 	9007C52B2 	9007C52A2 	9007C52N2 	9007C52C
Weight, kg (lb)	0.481 (1.06)	0.481 (1.06)	0.481 (1.06)	0.481 (1.06)
Contact operation	 contact closed contact open			

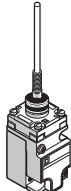
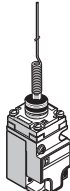
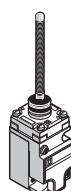
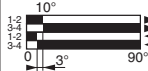
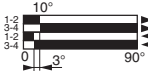
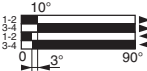
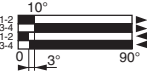
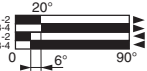
Specifications (nominal operating data)

Switch actuation	By 30° cam			
Type of actuation				
Pre-travel	10°	5°	10°	45°
Total travel	90°	90°	90°	90°
Differential	4°	2°	4°	—
Reverse overtravel	90°	90°	90°	—
Operating torque/force 1 pole & 2 pole	4 lb-in (0.45 N•m)		25 oz-in (0.18 N•m)	3 lb-in (0.34 N•m)
Terminal wire sizes (cabling/screw clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm²) wires maximum			
Repeatability (linear travel of cam)	0.05 mm (± 0.002 in.)	0.03 mm (± 0.001 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)
Cable entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

(1) Lever arm type must be ordered separately from pages ? to 31.
(2) These devices are factory set to operate the contacts in both the CW and CCW directions.
To order factory converted devices: For CCW only operation, change the 2 at the end of the Type number to 1 (for example, C52B2 becomes C52B1). For CW only operation, delete the 2 at the end of the Type number (for example, C52B2 becomes C52B).

Mode of operation of the lever arm is easily convertible to clockwise or both.
Pull out and rotate the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW.



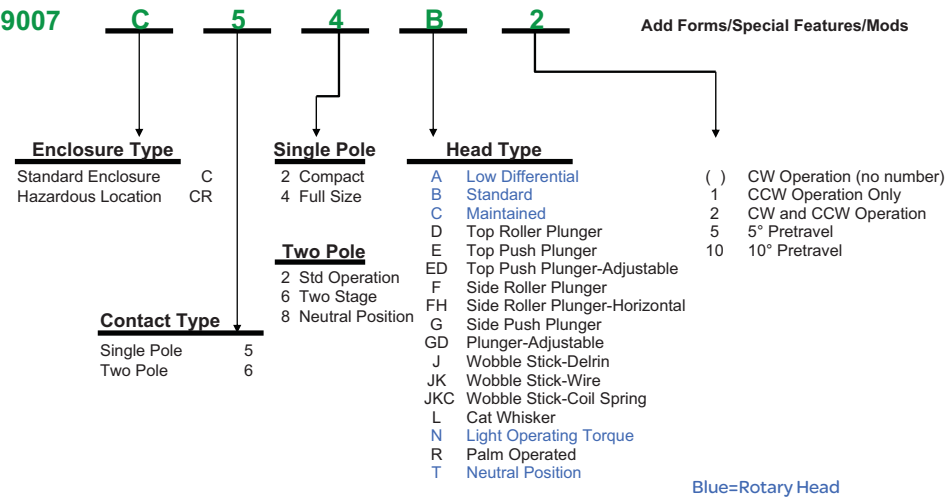
Type of head		Flexible operator (wobble stick)				
Compact plug-in body type						
Type of operator		Universal (1)	Wobble stick acetal resin extension (1)	Wobble stick wire extension (1)	Wobble stick coil spring extension (1)	Cat whisker
Catalog numbers						
1 N.O. 1 N.C. 						
Weight, kg (lb)		0.468 (1.03)	0.568 (1.25)	0.540 (1.19)	0.568 (1.25)	0.468 (1.03)
Contact operation		 contact closed  contact open				
Specifications (nominal operating data)						
Switch actuation		By any moving object 				
Type of actuation						
Pre-travel		10° (any direction)				20°
Total travel		90°				
Differential		3°				6°
Reverse overtravel		—				
Operating torque/force 1 pole & 2 pole		3 lb-in (0.34 N•m)				7 oz-in (0.05 N•m)
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum				
Repeatability (linear travel of cam)		—				
Cable entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry				

(1) Wobble stick extensions are available separately for the universal head. See below.

Description	Type of extension	Catalog number	Weight kg (lb)
Wobble stick extensions for the universal head, and as replacements for complete devices	Acetal resin extension	9007WJ	0.01 (0.03)
	Wire extension	9007WK	0.01 (0.02)
	Coil spring extension	9007WKC	0.02 (0.04)

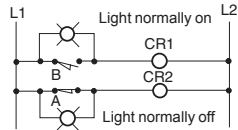
9007 C Limit Switch

The table below is intended to help understand how the catalog number is laid out. It is to be used with existing numbers only from the catalog. New catalog numbers should not be generated, built up, or developed from the table below. If the contact sequence is not listed, contact your local field office.

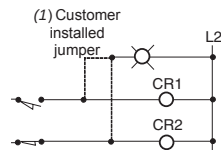




Rotary head shown with S9 option



Forms P5 through P9



Form P10

(1) Only one of the jumpers may be used. The pilot light is ON when the load is energized.

Optional features and modifications

Optional features do not apply to 9007CR unless noted. Not field installable, except where noted.

Shaft equipped with hub for mounting larger diameter lever used with 9007T/FT limit switches

Description	Ordering information
Optional hub to allow 9007C, CF or CR limit switches with a rotary lever arm to accept the lever arms normally used with 9007T and FT limit switches.	Factory modification (hub and shaft combination) Add suffix S9 to the device catalog number (for example, to order a 900754B2 with this modification, order as a 9007C54B2S9.
	Field installable (hub only) Order catalog number 9007S9

Addition of LED pilot light (1)

Description	Contact arrangement	Suffix to add to the device catalog number
LED pilot light, 24 to 120 V AC or DC on plug-in type switch	Addition of LED pilot light in parallel with N.O. contact (light normally on)	P5
	Addition of LED pilot light in parallel with N.C. contact (light normally off)	P6
	Addition of two LED pilot lights, one in parallel with N.O. contact (light normally on), one in parallel with N.C. contact (light normally off)	P7
	Addition of two LED pilot lights in parallel with N.O. contacts (lights normally on)	P8 (2)
	Addition of two LED pilot lights in parallel with N.C. contacts (lights normally off)	P9 (2)
	Addition of one isolated LED pilot light (light on when load is energized)	P10 (3)

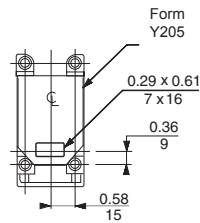
(1) Bleeder circuit must be added to ensure PLC compatibility.

(2) 9007C62, C66 or C68 only.

(3) 9007C54 only. Not available with prewired receptacles.

Examples of complete units with pilot lights in standard plug-in body type

Single pole	Catalog number	Weight kg (lb)
Side plunger	9007C54FP6	0.57 (1.25)
Top plunger	9007C54DP6	0.57 (1.25)
	9007C54EP6	0.57 (1.25)
Rotary	9007C54B2P6	0.57 (1.25)
Wobble stick	9007C54LP6	0.57 (1.25)
	9007C54JP6	0.57 (1.25)
Two poles		
Side plunger	9007C62FP6	0.57 (1.25)
Top plunger	9007C62DP6	0.57 (1.25)
	9007C62EP6	0.57 (1.25)
Rotary	9007C62B2P6	0.57 (1.25)
Wobble stick	9007C62LP6	0.57 (1.25)
	9007C62JP6	0.57 (1.25)



Y2051

Optional features and modifications (continued)

Optional features do not apply to 9007CR unless noted. Not field installable, except where noted.

Description	Suffix to add to the device catalog number
Manifold mounting	Y205
Low temperature – lever types only: limit switch will operate in an ambient temperature range of -40 to 185 °F (standard limit switch ambient temperature range is -20 to 185 °F). Minimum temperature is based on the absence of freezing moisture or water.	Y128
Fluoroelastomer gaskets and seals (1)	
Substitution of fluoroelastomer gaskets and seals on:	
Lever arm type, standard box (fluoroelastomer shaft seals on lever arm types as standard)	Y140
Lever arm type, compact box (fluoroelastomer shaft seals on lever arm types as standard)	Y140
Plunger type, standard box	Y140
Plunger type, compact box	Y140
Substitution of fluoroelastomer boot only on plunger type switches	Y1401
(1) Fluorocarbon (as found in fluoroelastomer seals) has been shown to resist sunlight aging problems.	
Conduit entry modification: To order 9007C with ISO M 20 thread, add the suffix M11 to the device number.	M11

The 9007CTxxxx terminal base is not available with M 11 threads. Order the complete switch shown here only. See the following chart.

Examples of complete unit catalog numbers with ISO M20 thread in standard plug-in body type

Type of head	Catalog number	Weight kg (lb)
Single pole		
Side plunger	9007C54FM11	0.57 (1.25)
Top plunger	9007C54DM11	0.57 (1.25)
	9007C54EM11	0.57 (1.25)
Rotary	9007C54B2M11	0.57 (1.25)
Wobble stick	9007C54LM11	0.57 (1.25)
	9007C54JM11	0.57 (1.25)
Two poles		
Side plunger	9007C62FM11	0.57 (1.25)
Top plunger	9007C62DM11	0.57 (1.25)
	9007C62EM11	0.57 (1.25)
Rotary	9007C62B2M11	0.57 (1.25)
Wobble stick	9007C62LM11	0.57 (1.25)
	9007C62JM11	0.57 (1.25)



Y190*

Standard body shown with
Y190* option

Optional features and modifications (continued)

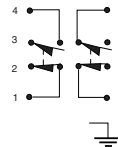
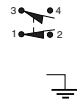
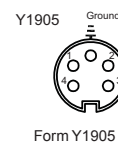
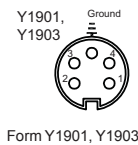
Optional features do not apply to 9007CR unless noted. Not field installable, except where noted.

Pre-wired receptacle (1) (2)

Description	For use	Suffix to add to the device catalog number	Weight kg (lb)
Plug-in limit switch furnished with pre-wired mini 5-pin Brad Harrison male connector			
Single pole	For use with Brad Harrison female portable plug No.41306, 41307 or 41308 (or equal).	Y1901	0.60 (1.33)
	Same as Y1901 but with different wire color coding	Y1905	0.60 (1.33)
Tamper proof screws in complete switch only			
Single pole	Same as Y1901 but with tamper proof screws on head and body	Y1903	0.60 (1.33)
	Similar to Y1905 except for double pole device	Y19013	0.60 (1.33)

(1) Plug and cable assemblies: see accessories page 6/?

(2) Not available with P10 or for hazardous location switches



Examples of complete unit catalog numbers with mini or micro connectors in standard plug-in body type

Type of head	Catalog number	Weight kg (lb)
Single pole, 5-pin mini connector (7/8"-16 UN-2A thread)		
Side plunger	9007C54FY1901	0.57 (1.25)
Top plunger	9007C54DY1901	0.57 (1.25)
	9007C54EY1901	0.57 (1.25)
Rotary	9007C54B2Y1901	0.57 (1.25)
Wobble stick	9007C54LY1901	0.57 (1.25)
	9007C54JY1901	0.57 (1.25)
Two poles, 9-pin mini connector (1-2/8"-16 UN-2A thread)		
Side plunger	9007C62FY19016	0.57 (1.25)
Top plunger	9007C62DY19016	0.57 (1.25)
	9007C62EY19016	0.57 (1.25)
Rotary	9007C62B2Y19016	0.57 (1.25)
Wobble stick	9007C62LY19016	0.57 (1.25)
	9007C62JY19016	0.57 (1.25)
Single pole, 5-pin micro single key (M12 x 1 thread)		
Side plunger	9007C62FY1912	0.57 (1.25)
	9007C54DY1912	0.57 (1.25)
Top plunger	9007C54EY1912	0.57 (1.25)
Rotary	9007C54B2Y1912	0.57 (1.25)
Wobble stick	9007C54LY1912	0.57 (1.25)
	9007C54JY1912	0.57 (1.25)
Single pole, 5-pin micro connector two keys (1/2"-20 UNF-2A thread)		
Side plunger	9007C54FY19019	0.57 (1.25)
Top plunger	9007C54DY19019	0.57 (1.25)
	9007C54EY19019	0.57 (1.25)
Rotary	9007C54B2Y19019	0.57 (1.25)
Wobble stick	9007C54LY19019	0.57 (1.25)
	9007C54JY19019	0.57 (1.25)



Y18**
Terminal base shown with
Y18** option

Optional features and modifications (continued)

Optional features do not apply to 9007CR unless noted. Not field installable, except where noted.

Potted limit (position) switch or plug-in receptacle only (1)

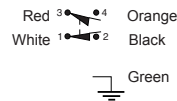
Description (2)			Suffix to add to the device catalog number	Weight kg (lb)
With individual wires	Single pole	With five #16 wires five ft long	Y1841	0.59 (1.30)
	Two pole	With nine #16 wires five ft long	Y1842	0.60 (1.32)
With STOWA cord	Single pole	With five conductor #16 STOWA cord eight ft long	Y1851	1.30 (2.88)
	Single pole	Same as Y1851 but with different wire color coding	Y1855	1.30 (2.88)
	Two pole	With nine conductor #16 STOWA cord eight ft long	Y1852	1.31 (2.90)
	Two pole	Same as Y1852 but with different wire color coding	Y1856	1.31 (2.90)
Tamper-proof screws—complete switch only				
With individual wires	Same as Y1841 but with tamper proof screws on head and body		Y1843	0.59 (1.30)
	Same as Y1842 but with tamper proof screws on head and body		Y1844	0.60 (1.32)
With STOWA cord	Same as Y1851 but with tamper proof screws on head and body		Y1853	1.30 (2.88)
	Same as Y1852 but with tamper proof screws on head and body		Y1854	1.30 (2.88)
	Same as Y1855 but with tamper proof screws on head and body		Y1857	1.31 (2.90)
	Same as Y1856 but with tamper proof screws on head and body		Y1858	1.31 (2.90)

(1) Not for 9007CR hazardous location devices

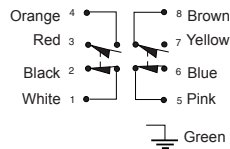
(2) Wire entry completely sealed with epoxy resin.

Wiring diagrams

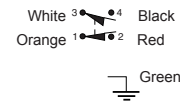
Forms Y1851 and Y1853



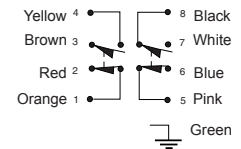
Forms Y1852 and Y1854



Forms Y1855 and Y1857



Forms Y1856 and Y1858



Optional features and modifications (continued)

Optional features do not apply to 9007CR unless noted. Not field installable, except where noted.

Shafts		
Description	Suffix to add to the device catalog number	Weight kg (lb)
Optional shaft, 7.8 mm (0.306 in.) diameter: To accommodate lever arms from the obsolete R.B.Denison® C limit switches. Available on all 9007C or CR limit switches	Y247	0.57 (1.25)
Optional shaft, 7.1 mm (0.28 in.) diameter: Available on all 9007C or CR limit switches	Y249	0.57 (1.25)
Switch with adapter plate		
Description	Suffix to add to the device catalog number	Weight kg (lb)
Switch with adapter plate permitting substitution of any 9007C switch with standard body for any type T switch with style B base plate	Y147	—
Positive opening contacts		
Description	Suffix to add to the device catalog number	Weight kg (lb)
Direct acting contact/positive opening contact block (slow break single pole only)	Y1561 ☹	0.566 (1.25)

One pole, normally closed, slow make-slow break, direct acting contact mechanism substituted for standard snap switch on 9007C52, C54 and CR53 devices. (Snap action not available.)
This mechanism was designed for use in emergency overtravel applications. The movable contact of this basic switch unit is acted upon directly by the actuating mechanism of the limit switch and is not dependent upon the force exerted by a snap switch blade or spring to open the circuit. Because these contacts are slow make-slow break, they are best suited for applications where they are not actuated during normal operation, but only if abnormal overtravel is encountered.

Electrical contact ratings									
AC—NEMA A600 maximum current—35% power factor						DC maximum current			
Volts	Make		Break		Continuous carrying	Volts	Make or break		Continuous carrying
	A	VA	A	VA	A		A	VA	A
120	60	7200	6	720	10	125	1.1/0.55 (1)	138/69 (1)	5/2.5 (1)
240	30	7200	3	720	10	—	—	—	—
480	15	7200	1.5	720	10	250	0.27	67.5	2.5
600	12	7200	1.2	720	10	600	0.10	60	2.5

(1) 9007C52 compact unit ratings at 125 Vdc—same ratings as 9007C54 and 9007CR53 at other voltages.

Limit switches

Class 9007C heavy duty industrial—plug-in body, metal

Accessories

Oversized hub only

Description	Catalog number	Weight kg (lb)
Hub can be field installed on any 9007C lever type switch, increasing the shaft diameter from 0.375–0.749 in. (9.53–19 mm), to accept levers normally used with 9007T/FT switches.	9007S9	0.02 (0.04)

Dust boot only

Description	Catalog number	Weight kg (lb)
Dust boot can be field installed on any 9007C and CR lever type switch	9007BT3	0.01 (0.01)

Conduit seal insert (field installable)

Description	Catalog number	Weight kg (lb)
Conduit seal fits in conduit entrance and excludes liquids		
5 hole seal	31032-488-01	0.01 (0.02)
9 hole seal	31032-815-01	0.01 (0.02)

Plug and cable assemblies

Description	Catalog number	Weight kg (lb)
5-pin mini connecting cables (to fit certain switches with Form Y190**)		
 Plug and 3 ft (0.91 m) cable	BH2053	—
Plug and 6 ft (1.83 m) cable	BH2056	—
Plug and 12 ft (3.66 m) cable	BH20512	—

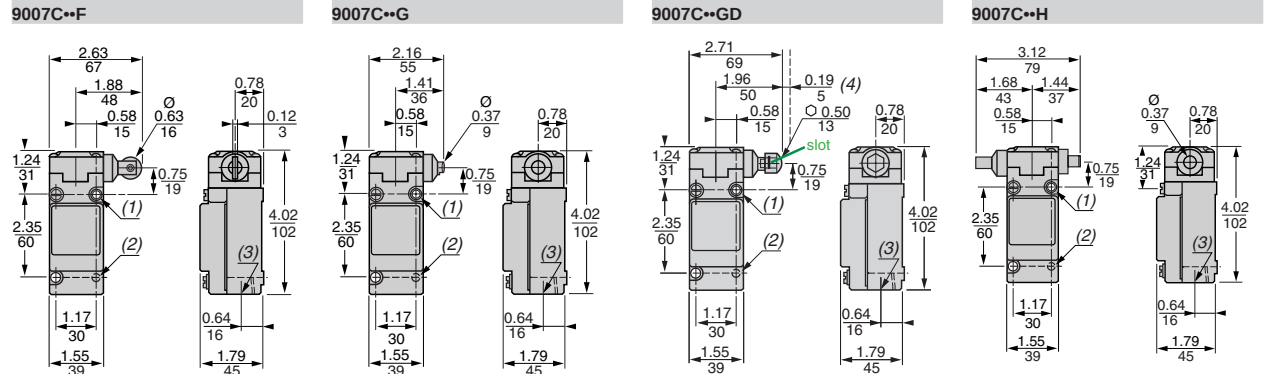
Note: Other cables available.

Adapter (field installable)

Description	Catalog number	Weight kg (lb)
Adapter plate kit only Plate plus mounting screws for substitution of any 9007C switch with standard box for any 9007T switch with style B base plate	9007BT1	0.23 (0.50)
Adapter plate for direct substitution of any 9007C plunger switches for 9007B plug-in plunger switches—use only if there is a problem in lining up cam tracks		
Standard body type	9007CT10 (1)	0.13 (0.28)
Compact body type	9007CT13 (2)	0.01 (0.20)
Adapter plate kit permitting direct substitution of any 9007C lever arm switch with standard box for any 9007AW lever arm switch	9007CT11	0.23 (0.50)
20 mm conduit connection adapter male 0.5 in. (12.7 mm) NPT on one end, female 0.787 in. (20 mm) on other end (20 mm x 1.5)	9007CT12	0.01 (0.20)

(1) Dimensions: 0.22 x 2.94 x 1.54 in. (5.6 x 75 x 39 mm)
(2) Dimensions: 0.22 x 2.07 x 1.54 in. (5.6 x 53 x 39 mm)

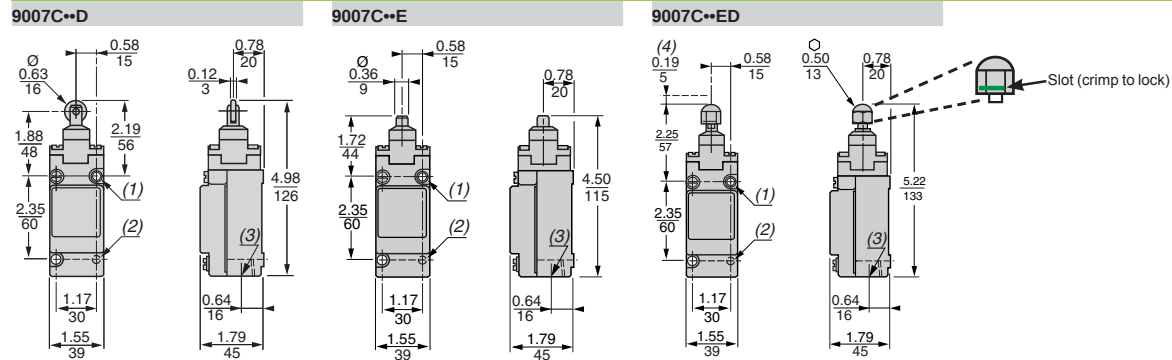
Side plunger



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

- (1) 2 x 0.20/5 x 0.22/6 HLS.
- (2) 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
- (2) 1/2 14 NPT.
- (2) Adjustable.

Top plunger

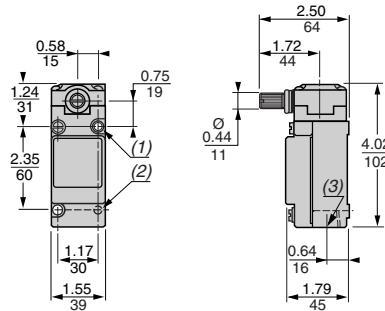


Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

- (1) 2 x 0.20/5 x 0.22/6 HLS.
- (2) 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
- (2) 1/2 14 NPT.
- (2) Adjustable; crimp to lock.

Rotary

9007C••• A, B, C, N, T5, T10

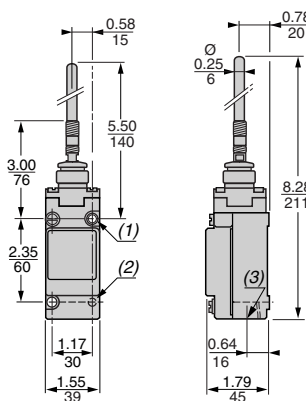
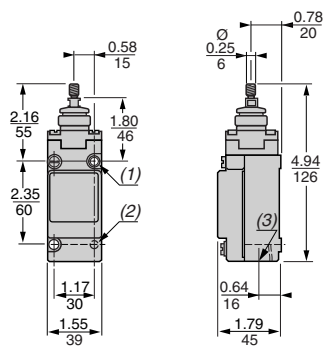


- (1) 2 x 0.20/5 x 0.22/6 HLS.
(2) 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
(3) 1/2 14 NPT.

Wobble stick

9007C••JKC

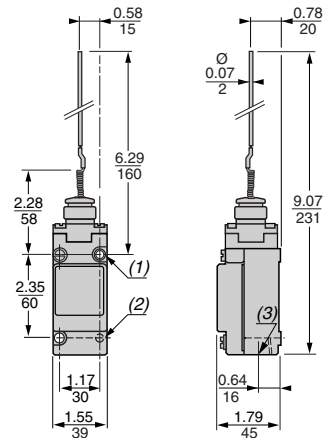
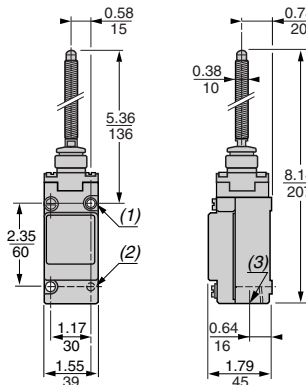
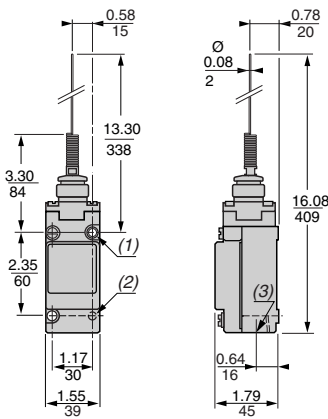
9007C••J



9007C••K

9007C••KC

9007C••L

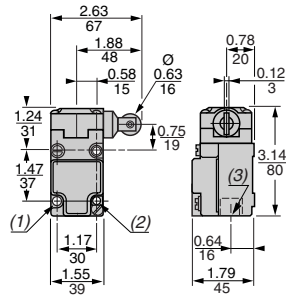


Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

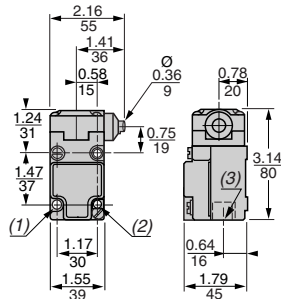
- (1) 2 x 0.20/5 x 0.22/6 HLS.
(2) 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
(3) 1/2 14 NPT.

Side plunger

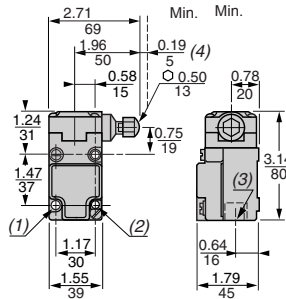
9007C52F



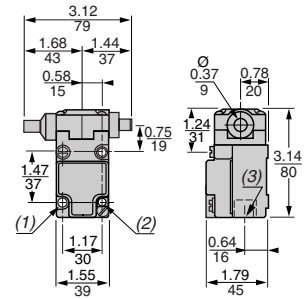
9007C52G



9007C52GD



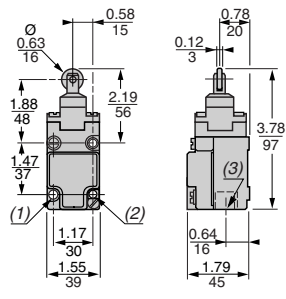
9007C52H



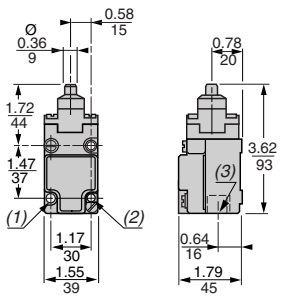
- (1) 2 x 0.20/5 HLS.
- (2) 2 x 10-24 Tapped HLS Back Mtg 0.20/5 DP.
- (2) 1/2 14 NPT.
- (2) Adjustable.

Top plunger

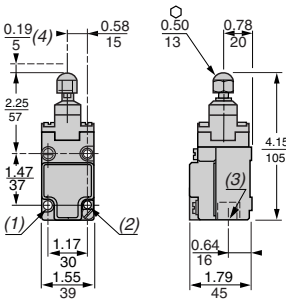
9007C52D



9007C52E



9007C52ED



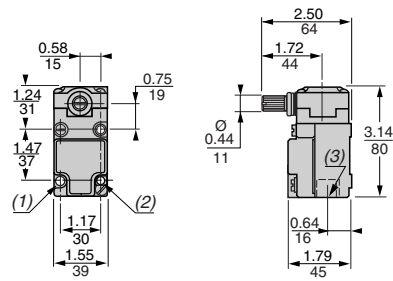
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

6

- (1) 2 x 0.20/5 HLS.
- (2) 2 x 10-24 Tapped HLS Back Mtg 0.20/5 DP.
- (2) 1/2 14 NPT.
- (2) Adjustable.

Rotary

9007C52-- A, B, C, N, T5, T10

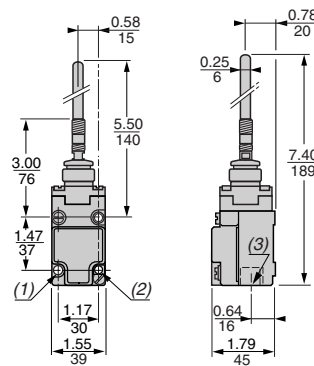
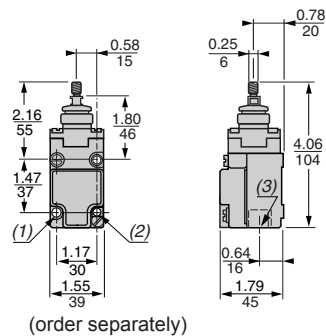


- (1) 2 x 0.20/5 x 0.22/6 HLS.
- (2) 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
- (2) 1/2 14 NPT.

Wobble stick

9007C52JKC

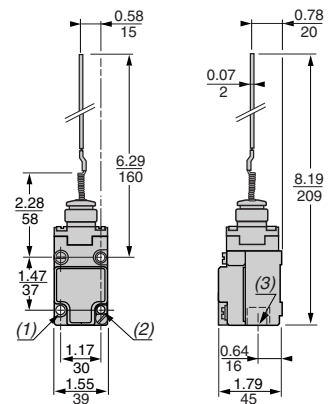
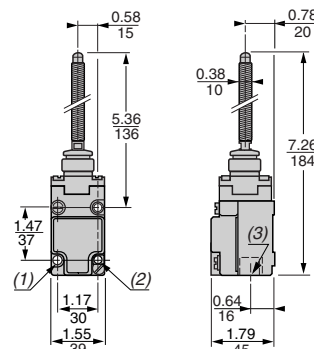
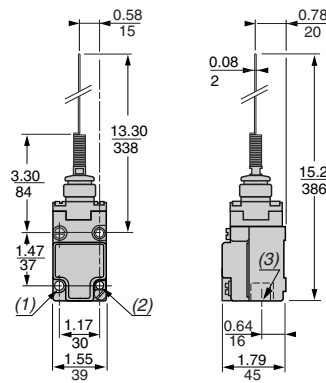
9007C52J



9007C52K

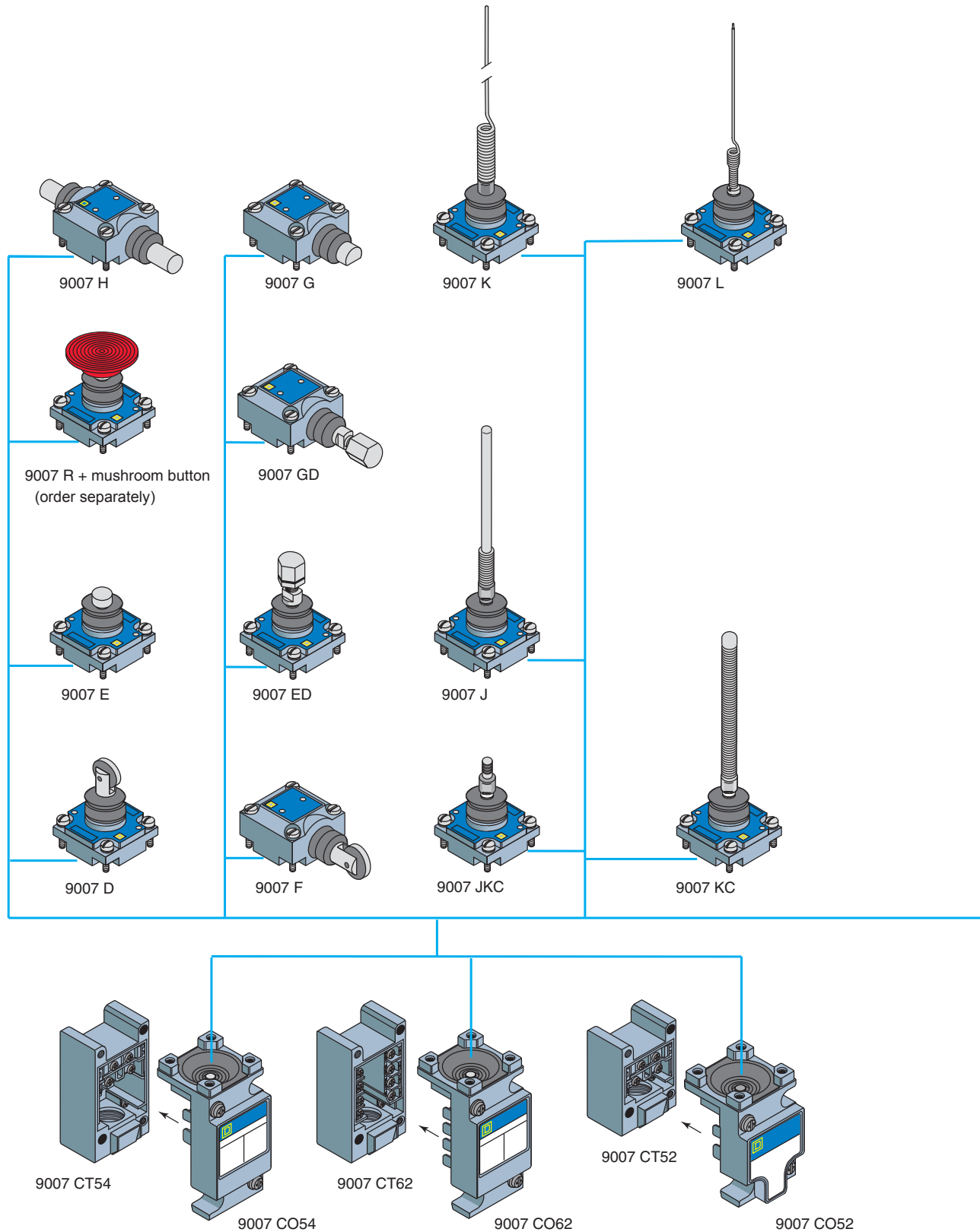
9007C52KC

9007C52L



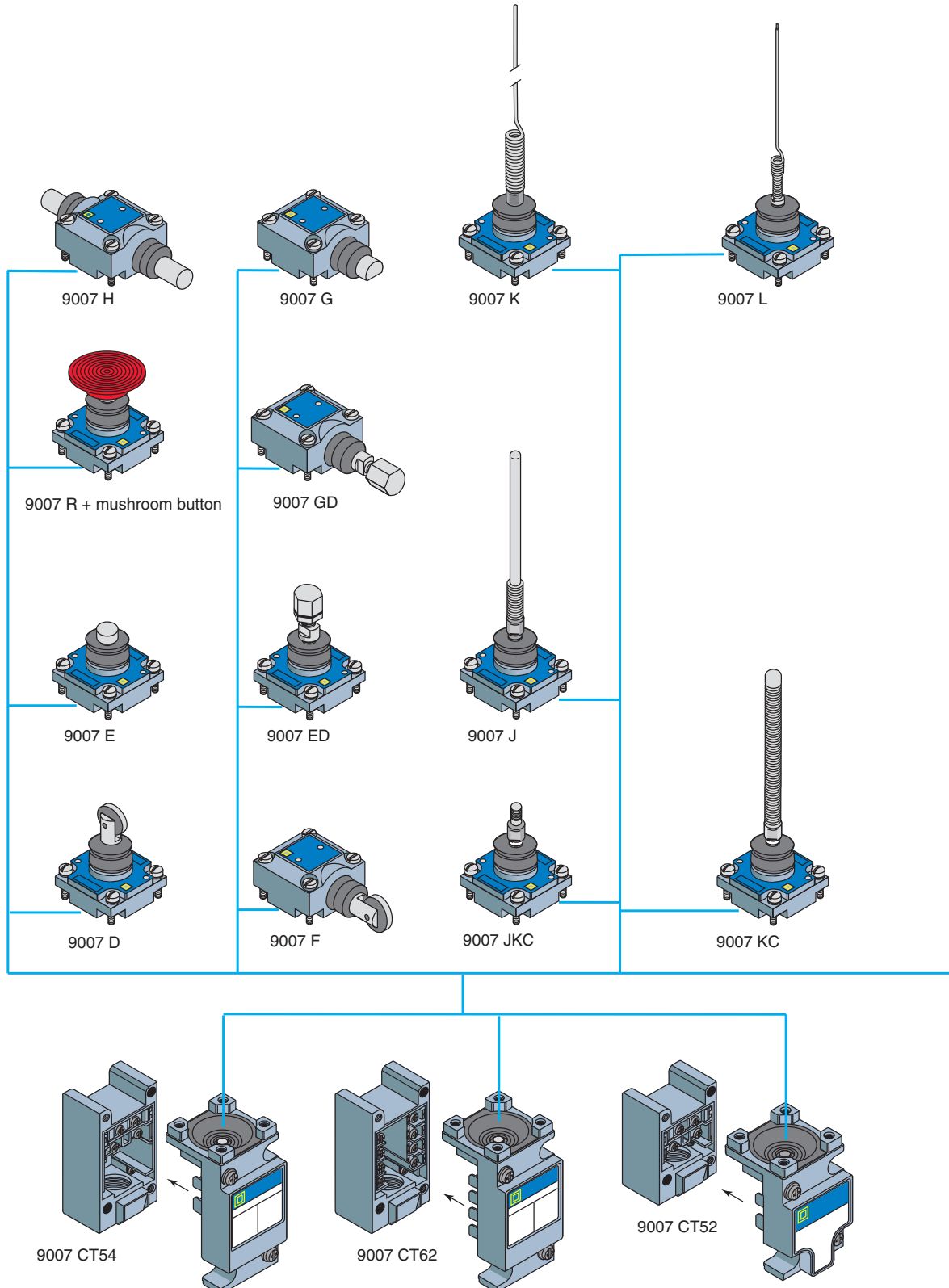
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

- (1) 2 x 0.20/5 x 0.22/6 HLS.
- (2) 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
- (2) 1/2 14 NPT.

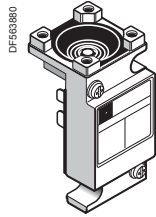


Limit switches

Class 9007C heavy duty industrial—plug-in body, metal

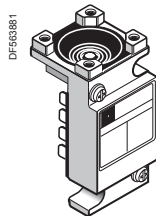


6



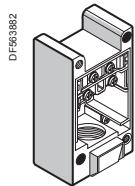
DF-563880

9007CO54



DF-563881

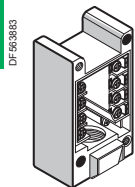
9007CO62



DF-563882

9007CT54

6



DF-563883

9007CT62

Body with contacts for plunger or rotary heads

Plug-in unit (top) with contacts

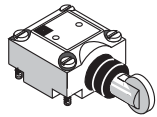
Type	Type of contact	Function diagram	Catalog number	Weight kg (lb)
For standard plug-in body type	Single pole		9007CO54	0.19 (0.42)
	Two pole		9007CO62	0.20 (0.44)
	Two stage		9007CO66	0.23 (0.50)
	Neutral position		9007CO68	0.20 (0.45)
For compact plug-in body type	Single pole		9007CO52	0.18 (0.40)

Plug-in receptacle (terminal base) with screw terminals (1)

Type	Type of contact	Catalog number	Weight kg (lb)
For standard plug-in body type	Single pole	9007CT54	0.22 (0.48)
	Two pole	9007CT62	0.22 (0.48)
	Neutral position	9007CT62	0.22 (0.48)
	Two stage	9007CT62	0.22 (0.48)
For compact plug-in body type	Single pole (do not apply to terminal base)	9007CT52	0.15 (0.34)

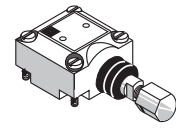
(1) Acceptable wire sizes: 12-22 AWG (2.05 mm²-0.644mm²); two maximum.
Recommended terminal clamp torque: 7 lb-in (0.80 N•m).

DF56384



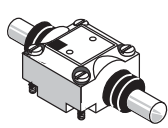
9007F

DF56385



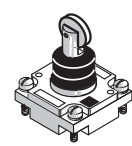
9007GD

DF564138



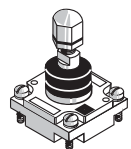
9007H

DF56388



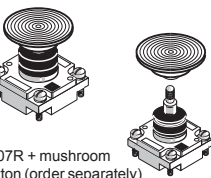
9007D

DF56387



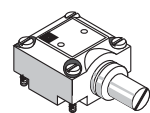
9007ED

DF56388



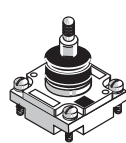
9007R + mushroom button (order separately)

DF56389



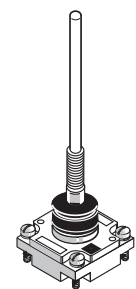
9007C

DF564139



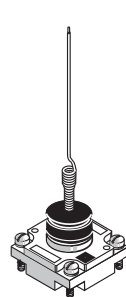
9007JKC

DF56380



9007J

DF56381



9007L

Heads for linear, rotary and multi-directional movements

Side plunger heads

Type of operator	Catalog number	Weight kg (lb)
Side roller plunger, spring return, vertical roller (1)	9007F	0.16 (0.36)
Side push rod plunger, spring return	9007G	0.15 (0.34)
Side push rod plunger, adjustable, spring return	9007GD	0.16 (0.36)
Side push rod plunger, maintained contact	9007H	0.16 (0.36)

(1) Field convertible to horizontal.

Top plunger heads

Type of operator	Catalog number	Weight kg (lb)
Top roller plunger, spring return	9007D	0.12 (0.26)
Top push rod plunger, spring return	9007E	0.11 (0.24)
Top push rod plunger, adjustable, spring return	9007ED	0.12 (0.27)
Palm operated turret head without mushroom button	9007R	0.13 (0.28)

Mushroom button: see Available operators chart below

Rotary heads (without lever arm type)

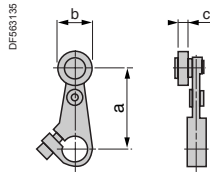
Type of operator	Type of direction	Catalog number	Weight kg (lb)
Standard pre-travel spring return	CW & CCW	9007B	0.19 (0.41)
Low differential spring return	CW & CCW	9007A	0.19 (0.41)
Neutral position	CW & CCW	9007T10	0.16 (0.36)
Standard pre-travel spring return	CW & CCW	9007T5	0.16 (0.36)
Low differential spring return	CW & CCW	9007N	0.18 (0.40)
Extra light operating torque spring return	CW & CCW	9007C	0.19 (0.41)
Maintained contact	CW (trip) CCW (reset)	9007C	0.19 (0.41)

Multi-directional head

Type of operator	Catalog number	Weight kg (lb)
Universal (see Available operators chart below)	9007JKC	0.19 (0.41)
Wobble stick, acetal resin extension (see chart below)	9007J	0.20 (0.43)
Wobble stick, wire extension (see chart below)	9007K	0.26 (0.57)
Wobble stick, coil spring extension (see chart below)	9007KC	0.22 (0.48)
Cat whisker	9007L	0.17 (0.37)

Available operators

Description	Diameter in. (mm)	Color	Catalog number	Weight kg (lb)
Mushroom button for palm operated turret head	1.38 (35)	Black	2358C6G3	0.03 (0.06)
		Red	2358C6G2	0.03 (0.06)
		Green	2358C6G6	0.03 (0.06)
		Yellow	2358C6G8	0.03 (0.06)
	2.25 (57.2)	Black	—	—
		Red	2358C22G3	0.05 (0.10)
		Green	2358C22G6	0.05 (0.10)
		Yellow	2358C22G8	0.05 (0.10)
Description	Type of extension		Catalog number	Weight kg (lb)
Wobble stick extensions for the universal head, and as replacements for complete devices	Acetal resin extension		9007WJ	0.01 (0.03)
	Wire extension		9007WK	0.01 (0.02)
	Coil spring extension		9007WKC	0.02 (0.04)



a: Length of lever arm
b: Roller diameter
c: Roller width



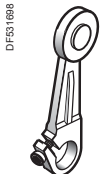
9007AA1



9007MA11



9007EA1



9007CA11

Cast zinc lever arms with roller

Lever arms with standard steel roller (1)

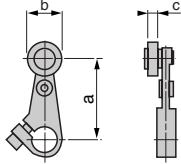
Arm	Steel roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
0.88 (22)	0.63 (16)	0.25 (6.3)	9007AA1	0.02 (0.05)
		0.63 (16)	9007AA2	0.03 (0.07)
1.38 (35)	0.75 (19)	0.25 (6.3)	9007BA11	0.03 (0.07)
		0.63 (16)	9007BA12	0.05 (0.10)
	0.63 (16)	0.25 (6.3)	9007BA1	0.03 (0.07)
		0.63 (16)	9007BA2	0.04 (0.08)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA11	0.03 (0.07)
		0.63 (16)	9007MA12	0.05 (0.11)
	0.63 (16)	0.25 (6.3)	9007MA1	0.03 (0.06)
		0.63 (16)	9007MA2	0.05 (0.10)
2 (51)	0.75 (19)	0.25 (6.3)	9007CA11	0.04 (0.08)
		0.63 (16)	9007CA12	0.05 (0.12)
	0.63 (16)	0.25 (6.3)	9007CA1	0.04 (0.08)
		0.63 (16)	9007CA2	0.05 (0.10)
2.5 (63.5)	0.75 (19)	0.25 (6.3)	9007DA11	0.05 (0.10)
		0.63 (16)	9007DA12	0.06 (0.13)
	0.63 (16)	0.25 (6.3)	9007DA1	0.04 (0.08)
		0.63 (16)	9007DA2	0.05 (0.11)
3 (76)	0.75 (19)	0.25 (6.3)	9007EA11	0.05 (0.10)
		0.63 (16)	9007EA12	0.06 (0.14)
	0.63 (16)	0.25 (6.3)	9007EA1	0.04 (0.09)
		0.63 (16)	9007EA2	0.06 (0.14)

Lever arms with nylon roller

Arm	Nylon roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
0.88 (22)	0.63 (16)	0.25 (6.3)	9007AA8	0.02 (0.05)
		0.63 (16)	9007AA17	0.03 (0.07)
1.38 (35)	0.75 (19)	0.25 (6.3)	9007BA18	0.03 (0.07)
		0.63 (16)	9007BA8	0.05 (0.10)
	0.63 (16)	0.25 (6.3)	9007BA17	0.05 (0.11)
		0.63 (16)	9007BA4	0.03 (0.06)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007BA13	0.05 (0.10)
		0.63 (16)	9007MA18	0.03 (0.06)
	0.63 (16)	0.25 (6.3)	9007MA8	0.05 (0.10)
		0.63 (16)	9007MA17	0.05 (0.10)
2 (51)	1 (25.4)	0.25 (6.3)	9007MA4	0.05 (0.10)
		0.63 (16)	9007MA13	0.05 (0.12)
	0.75 (19)	0.25 (6.3)	9007CA18	0.05 (0.10)
		0.63 (16)	9007CA8	0.03 (0.06)
2.5 (63.5)	0.63 (16)	0.25 (6.3)	9007CA17	0.03 (0.07)
		0.63 (16)	9007CA4	0.05 (0.12)
	1 (25.4)	0.25 (6.3)	9007CA13	0.06 (0.14)
		0.63 (16)	9007DA18	0.03 (0.07)
3 (76)	0.75 (19)	0.25 (6.3)	9007DA8	0.06 (0.13)
		0.63 (16)	9007DA17	0.06 (0.13)
	0.63 (16)	0.25 (6.3)	9007DA4	0.06 (0.14)
		0.63 (16)	9007DA13	0.07 (0.15)
	0.75 (19)	0.25 (6.3)	9007EA18	0.04 (0.08)
		0.63 (16)	9007EA8	0.06 (0.14)
	0.63 (16)	0.25 (6.3)	9007EA17	0.07 (0.16)
		0.63 (16)	9007EA4	0.07 (0.15)
	1 (25.4)	0.25 (6.3)	9007EA13	0.08 (0.17)
		0.63 (16)		

(1) Material is hardened, oil-impregnated, sintered iron.

DF563 155



a: Length of lever arm
b: Roller diameter
c: Roller width

Cast zinc lever arms (continued)

Lever arms with ball bearing roller

Arm	Ball bearing roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
0.88 (22)	0.69 (17.5)	0.25 (6.3)	9007AA9	0.04 (0.09)
1.38 (35)	0.69 (17.5)	0.25 (6.3)	9007BA9	0.04 (0.09)
1.5 (38)	0.69 (17.5)	0.25 (6.3)	9007MA9	0.04 (0.09)
2 (51)	0.69 (17.5)	0.25 (6.3)	9007CA9	0.04 (0.09)
2.5 (63.5)	0.69 (17.5)	0.25 (6.3)	9007DA9	0.04 (0.09)
3 (76)	0.69 (17.5)	0.25 (6.3)	9007EA9	0.04 (0.09)

Lever arms with roller on opposite side to standard

Lever arm	Roller on opposite side		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
0.88 (22)	0.63 (16)	0.25 (6.3)	9007AA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007AA6	0.04 (0.09)
1.38 (35)	0.75 (19)	0.25 (6.3)	9007BA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007BA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007BA6	0.04 (0.09)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007MA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007MA6	0.04 (0.09)
2 (51)	0.75 (19)	0.25 (6.3)	9007CA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007CA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007CA6	0.04 (0.09)
2.5 (63.5)	0.75 (19)	0.25 (6.3)	9007DA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007DA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007DA6	0.04 (0.09)
3 (76)	0.75 (19)	0.25 (6.3)	9007EA15	0.04 (0.09)
	0.63 (16)	0.25 (6.3)	9007EA5	0.04 (0.09)
	0.63 (16)	0.63 (16)	9007EA6	0.04 (0.09)

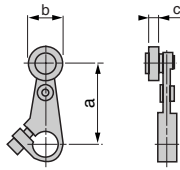
Lever arms with roller countersunk roller pin

Arm	Roller (countersunk roller pin)		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Diameter (b) in. (mm)	Width (c) in. (mm)		
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA31	0.03 (0.07)
2 (51)	0.75 (19)	0.25 (6.3)	9007CA31	0.04 (0.08)
2.5 (63.5)	0.75 (19)	0.25 (6.3)	9007DA31	0.04 (0.09)

Lever arms with cable operated with eyebolt (I.D.) instead of roller

Arm	Cable	Catalog number	Weight kg (lb)
Length in. (mm)	Diameter in. (mm)		
1.5 (38)	0.38 (9.6)	9007MA22	0.05 (0.10)

6



a: Length of lever arm
b: Roller diameter
c: Roller width



9007LA4

Flat steel lever arms with standard roller (1)

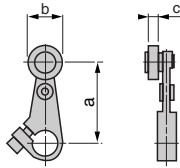
Arm	Roller		Catalog number	Weight kg (lb)
Length <i>(a)</i> in. (mm)	Diameter <i>(b)</i> in. (mm)	Width <i>(c)</i> in. (mm)		
Lever arms with steel roller				
0.88 (22)	0.63 (16)	0.25 (6.3)	9007AA1S	0.01 (0.03)
	0.63 (16)	0.63 (16)	9007AA2S	0.01 (0.03)
1.38 (35)	0.63 (16)	0.25 (6.3)	9007BA1S	0.01 (0.03)
	0.63 (16)	0.63 (16)	9007BA2S	0.01 (0.03)
2 (51)	0.63 (16)	0.25 (6.3)	9007CA1S	0.03 (0.07)
	0.63 (16)	0.63 (16)	9007CA2S	0.04 (0.08)
2.5 (63.5)	0.63 (16)	0.25 (6.3)	9007DA1S	0.04 (0.08)
	0.63 (16)	0.63 (16)	9007DA2S	0.04 (0.08)
3 (76)	0.63 (16)	0.25 (6.3)	9007EA1S	0.04 (0.08)
	0.63 (16)	0.63 (16)	9007EA2S	0.04 (0.08)
Lever arms with nylon roller				
1.38 (35)	1 (25.4)	0.25 (6.3)	9007BA4S	0.01 (0.03)
1.5 (38)	0.75 (19)	0.25 (6.3)	9007MA18S	0.01 (0.03)
2 (51)	1 (25.4)	0.25 (6.3)	9007CA4S	0.03 (0.07)
2.5 (63.5)	1 (25.4)	0.25 (6.3)	9007DA4S	0.04 (0.08)
3 (76)	1 (25.4)	0.25 (6.3)	9007EA4S	0.04 (0.08)
Lever arms without roller				
0.88 (22)	—	—	9007AA0S	
1.38 (35)	—	—	9007BA0S	0.01 (0.02)
2 (51)	—	—	9007CA0S	0.03 (0.06)
2.5 (63.5)	—	—	9007DA0S	0.03 (0.07)
3 (76)			9007EA0S	0.03 (0.07)

(1) Material is hardened, oil-impregnated, sintered iron.

90° forked cast zinc lever arms

Arm	Roller position	Roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)		Diameter (b) in. (mm)	Width (c) in. (mm)		
Lever arms with steel roller					
1.5 (38)	Rollers on same side	0.75 (19)	0.25 (6.3)	9007LA4	0.05 (0.12)
		0.63 (16)	0.25 (6.3)	9007LA1	0.07 (0.15)
	R.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA5	0.05 (0.12)
		0.63 (16)	0.25 (6.3)	9007LA2	0.07 (0.15)
	L.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA6	0.05 (0.12)
		0.63 (16)	0.25 (6.3)	9007LA3	0.07 (0.15)
Lever arms with nylon rollers					
1.5 (38)	Rollers on same side	0.75 (19)	0.25 (6.3)	9007LA16	0.04 (0.09)
			1 (25.4)	9007LA10	0.06 (0.14)
	R.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA17	0.04 (0.09)
			1 (25.4)	9007LA11	0.06 (0.14)
	L.H. Roller on opposite side	0.75 (19)	0.25 (6.3)	9007LA18	0.04 (0.09)
			1 (25.4)	9007LA12	0.06 (0.14)
Lever arms with ball bearing rollers					
1.5 (38)	Rollers on same side	0.69 (17.5)	0.25 (6.3)	9007LA7	0.11 (0.25)
	R.H. Roller on opposite side	0.69 (17.5)	0.25 (6.3)	9007LA8	0.11 (0.25)
	L.H. Roller on opposite side	0.69 (17.5)	0.25 (6.3)	9007LA9	0.11 (0.25)

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a: Length of lever arm
b: Roller diameter
c: Roller width



9007RA11



9007BA3



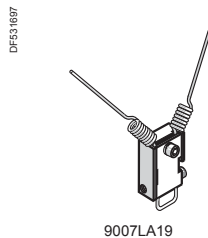
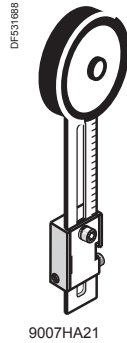
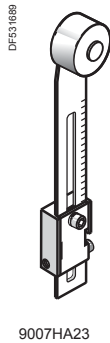
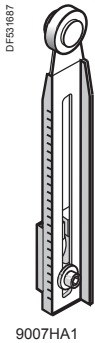
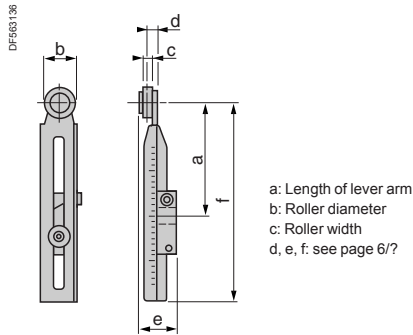
9007KA11

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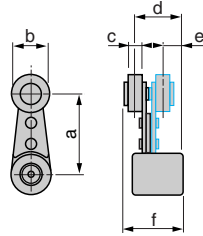


9007KB11

One-way lever arm					
Arm		Steel roller		Catalog number	Weight kg (lb)
Length ^(a) in. (mm)		Diameter ^(b) in. (mm)	Width ^(c) in. (mm)		
Lever arm with standard roller					
1.5 (38)		0.75 (19)	0.25 (6.3)	9007RA11	0.05 (0.12)
Lever arm with nylon roller					
1.5 (38)		0.75 (19)	0.25 (6.3)	9007RA18	0.05 (0.12)
Lever arm with ball bearing roller					
1.5 (38)		0.69 (17.5)	0.25 (6.3)	9007RA9	0.05 (0.12)
Lever arm with rod type					
5 (127)		—	—	9007FA2	0.05 (0.12)
One-way cast zinc roller lever arm					
Arm		Roller		Catalog number	Weight kg (lb)
Length ^(a) in. (mm)		Diameter ^(b) in. (mm)	Width ^(c) in. (mm)		
Cast arm with steel roller					
1.38 (35)		1.25 (32)	0.25 (6.3)	9007BA3	0.07 (0.15)
1.5 (38)		1.25 (32)	0.25 (6.3)	9007MA3	0.10 (0.23)
2 (51)		1.25 (32)	0.25 (6.3)	9007CA3	0.12 (0.27)
2.5 (63.5)		1.25 (32)	0.25 (6.3)	9007DA3	0.12 (0.27)
3 (76)		1.25 (32)	0.25 (6.3)	9007EA3	0.13 (0.29)
Flat steel arm with steel roller					
1.38 (35)		1.25 (32)	0.25 (6.3)	9007BA3S	0.07 (0.15)
2 (51)		1.25 (32)	0.25 (6.3)	9007CA3S	0.10 (0.23)
2.5 (63.5)		1.25 (32)	0.25 (6.3)	9007DA3S	0.12 (0.27)
3 (76)		1.25 (32)	0.25 (6.3)	9007EA3S	0.13 (0.29)
Offset type cast zinc lever arm					
Offset lever arm		Roller		Catalog number	Weight kg (lb)
Length in. (mm)	Offset	Diameter in. (mm)	Width in. (mm)		
Offset cast zinc arm with steel roller					
2 (51)	0.44 (11)	0.63 (16)	0.25 (6.3)	9007KA1	0.04 (0.08)
		0.63 (16)	0.63 (16)	9007KA2	0.04 (0.08)
		0.75 (19)	0.25 (6.3)	9007KA11	0.04 (0.09)
		0.75 (19)	0.63 (16)	9007KA12	0.05 (0.12)
1.5 (38)	0.88 (22)	0.75 (19)	0.25 (6.3)	9007KB11	0.04 (0.10)
		0.75 (19)	0.25 (6.3)	9007KB15	0.04 (0.10)
Offset cast zinc arm with ball bearing roller					
2 (51)	0.44 (11)	0.69 (17.5)	0.25 (6.3)	9007KA9	0.04 (0.10)
Offset cast zinc arm with nylon roller					
2 (51)	0.44 (11)	0.75 (19)	0.25 (6.3)	9007KA18	0.04 (0.10)
		0.75 (19)	1 (25.4)	9007KA21	0.04 (0.10)



Adjustable length lever arm				
Lever arm	Roller		Catalog number	Weight kg (lb)
Dimensions length <i>(a)</i> in. (mm)	Diameter <i>(b)</i> in. (mm)	Width <i>(c)</i> in. (mm)		
Adjustable length arm with steel roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA1	0.05 (0.12)
	0.63 (16)	0.63 (16)	9007HA2	0.07 (0.14)
Bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA5	0.06 (0.14)
	0.63 (16)	0.63 (16)	9007HA6	0.04 (0.18)
Adjustable length arm with nylon roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA4	0.05 (0.12)
	1 (25.4)	0.63 (16)	9007HA22	0.06 (0.13)
Bendable, adjustable from 0.88 (22) to 4 (101)	0.63 (16)	0.25 (6.3)	9007HA8	0.06 (0.14)
	1.0 (16)	0.63 (16)	9007HA23	0.07 (0.16)
	2 (51)	0.25 (6.3)	9007HA26	0.08 (0.17)
Adjustable length arm with ball bearing roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	0.69 (17.5)	0.25 (6.3)	9007HA24	0.06 (0.13)
Bendable, adjustable from 0.88 (22) to 4 (101)	0.69 (17.5)	0.25 (6.3)	9007HA25	0.07 (0.16)
Adjustable length arm with ball acetal resin roller				
Bendable, adjustable from 0.88 (22) to 4 (101)	1.63 (41)	0.25 (6.3)	9007HA20	0.07 (0.16)
Adjustable length arm with rubber tire roller				
Bendable, adjustable from 0.88 (22) to 4 (101)	2.13 (54)	0.5 (12.7)	9007HA21	0.10 (0.22)
Adjustable length arm without roller				
Non-bendable, adjustable from 0.88 (22) to 4 (101)	—	—	9007HA0	0.15 (0.33)
Bendable, adjustable from 0.88 (22) to 4 (101)	—	—	9007HA9	0.11 (0.25)
Rod type lever arm				
Description	Length		Catalog number	Weight kg (lb)
	in. (mm)			
Rod				
Stainless steel rod	10 (254)		9007FA1	0.07 (0.15)
Spring rod, steel	12 (304)		9007FA3	0.07 (0.15)
Spring rod, acetal resin	12 (304)		9007FA5	0.07 (0.15)
Looped acetal resin rod arm	—		9007FA6	0.05 (0.11)
90° forked rod				
Spring rods, steel	2.5 (63.5)		9007LA19	0.06 (0.13)



a: Length of lever arm
b: Roller diameter
c: Roller width
d, e: see page 6/?

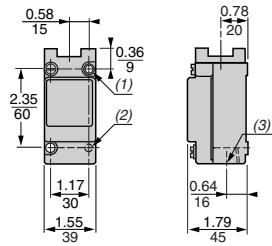
360° angular adjustable lever arm

360° angular adjustable lever arm		Roller		Catalog number	Weight kg (lb)
Length (a) in. (mm)	Roller (1) position	Diameter (b) in. (mm)	Width (c) in. (mm)		
Lever arms with steel roller					
0.88 (22)	Roller outside	0.63 (16)	0.25 (6.3)	9007AA1M	0.09 (0.20)
	Roller inside	0.63 (16)	0.25 (6.3)	9007AA5M	0.09 (0.20)
	Roller outside	0.75 (19)	0.25 (6.3)	9007AA11M	0.09 (0.20)
1.38 (35)	Roller outside	0.63 (16)	0.25 (6.3)	9007BA1M	0.09 (0.22)
	Roller inside	0.63 (16)	0.25 (6.3)	9007BA5M	0.10 (0.22)
	Roller outside	0.75 (19)	0.25 (6.3)	9007BA11M	0.10 (0.22)
1.5 (38)	Roller outside	0.63 (16)	0.25 (6.3)	9007MA1M	0.11 (0.24)
	Roller inside	0.63 (16)	0.25 (6.3)	9007MA5M	0.11 (0.24)
	Roller outside	0.75 (19)	0.25 (6.3)	9007MA11M	0.11 (0.24)
2 (51)	Roller outside	0.63 (16)	0.25 (6.3)	9007CA1M	0.11 (0.24)
	Roller inside	0.63 (16)	0.25 (6.3)	9007CA5M	0.11 (0.24)
	Roller outside	0.75 (19)	0.25 (6.3)	9007CA11M	0.11 (0.25)
2.5 (63.5)	Roller outside	0.63 (16)	0.25 (6.3)	9007DA1M	0.11 (0.25)
	Roller inside	0.63 (16)	0.25 (6.3)	9007DA5M	0.12 (0.27)
	Roller outside	0.75 (19)	0.25 (6.3)	9007DA11M	0.12 (0.27)
3 (76)	Roller outside	0.63 (16)	0.25 (6.3)	9007EA1M	0.12 (0.27)
	Roller inside	0.63 (16)	0.25 (6.3)	9007EA5M	0.12 (0.27)
	Roller outside	0.75 (19)	0.25 (6.3)	9007EA11M	0.13 (0.29)
Lever arms with nylon roller					
0.88 (22)	Roller outside	0.63 (16)	0.25 (6.3)	9007AA8M	0.09 (0.20)
		0.75 (19)	0.25 (6.3)	9007AA18M	0.09 (0.20)
		0.63 (16)	0.25 (6.3)	9007BA8M	0.11 (0.25)
1.38 (35)	Roller outside	0.75 (19)	0.25 (6.3)	9007BA18M	0.11 (0.25)
		0.63 (16)	0.25 (6.3)	9007MA8M	0.10 (0.23)
		0.75 (19)	0.25 (6.3)	9007MA18M	0.11 (0.25)
1.5 (38)	Roller outside	0.63 (16)	0.25 (6.3)	9007CA8M	0.12 (0.27)
		0.75 (19)	0.25 (6.3)	9007CA18M	0.12 (0.27)
		0.63 (16)	0.25 (6.3)	9007DA8M	0.12 (0.27)
2 (51)	Roller outside	0.75 (19)	0.25 (6.3)	9007DA18M	0.12 (0.27)
		0.63 (16)	0.25 (6.3)	9007EA8M	0.12 (0.26)
		0.75 (19)	0.25 (6.3)	9007EA18M	0.12 (0.27)
2.5 (63.5)	Roller outside	0.63 (16)	0.25 (6.3)	9007EA8M	0.12 (0.26)
		0.75 (19)	0.25 (6.3)	9007EA18M	0.12 (0.27)
		0.63 (16)	0.25 (6.3)	9007EA8M	0.12 (0.26)
3 (76)	Roller outside	0.75 (19)	0.25 (6.3)	9007EA18M	0.12 (0.27)
Lever arms with ball bearing roller					
0.88 (22)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007AA9M	0.10 (0.23)
1.38 (35)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007BA9M	0.11 (0.24)
1.5 (38)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007MA9M	0.19 (0.26)
2 (51)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007CA9M	0.19 (0.26)
2.5 (63.5)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007DA9M	0.12 (0.27)
3 (76)	Roller outside	0.69 (17.5)	0.25 (6.3)	9007EA9M	0.13 (0.28)

(1) Roller can be changed in the field from roller outside to roller inside position or vice versa.

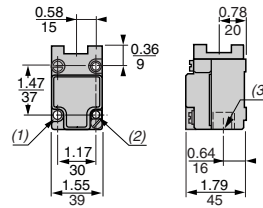
Body

Standard



- (1) 2 x 0.20/5 x 0.22/6 HLS.
(2) 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
(3) 1/2 14 NPT.

Compact

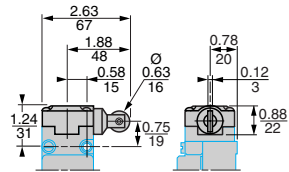


Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

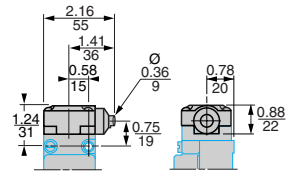
- (1) 2 x 0.20/5 HLS.
(2) 2 x 10-24 Tapped HLS Back Mtg 0.20/5 DP.
(3) 1/2 14 NPT.

Side plunger heads

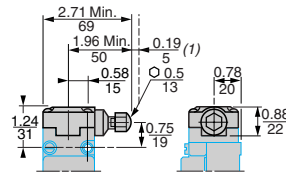
9007F



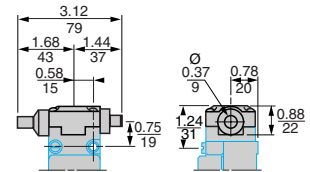
9007G



9007GD

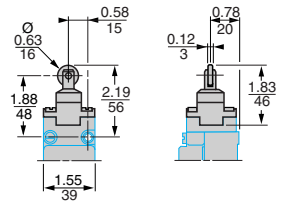


9007H

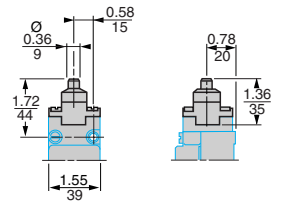


Top plunger heads

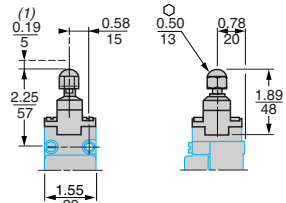
9007D



9007E



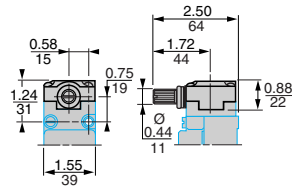
9007ED



(1) Adjustable

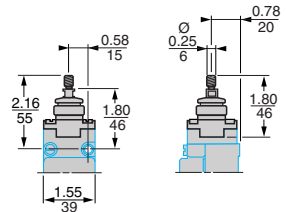
Rotary heads

9007C, A, B, G, N, T5, T10

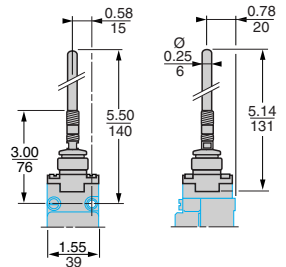


Multi-directional heads

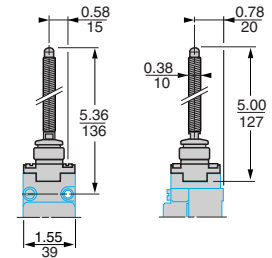
9007JKC



9007J

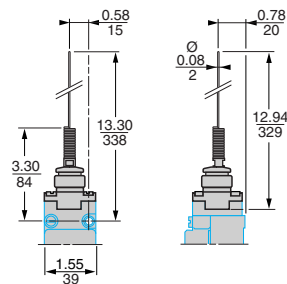


9007KC

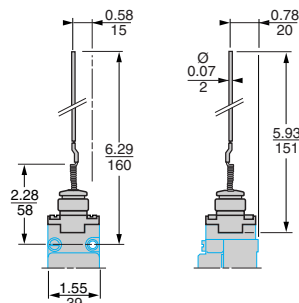


Multi-directional heads (continued)

9007K

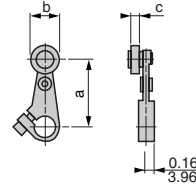


9007L



Lever arms

9007AA**, BA**, CA**, DA**, EA**, FA**, KA**, LA**, MA**, RA**

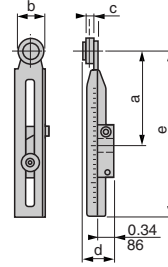


a: Length of lever arm
b: Roller diameter
c: Roller width

a, b, c: pages 6/? to 6/?

Adjustable length lever arms

9007HA• and 9007HA***

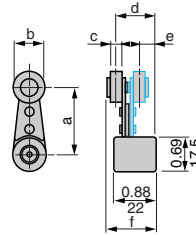


a: Length of lever arm
b: Roller diameter
c: Roller width
d = 0.38/10
e = 4.38/111

a, b, c: page 6/30

360° angular adjustable lever arms

9007AA**M, 9007BA**M, 9007CA**M, 9007DA**M, 9007EA**M, 9007MA**M

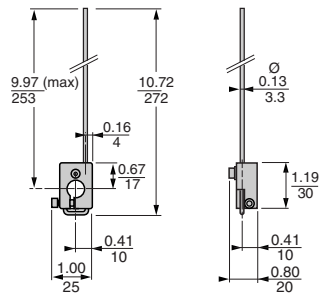


a: Length of lever arm
b: Roller diameter
c: Roller width
d = 0.84/21
e = 0.38/10
f = 1.05/27

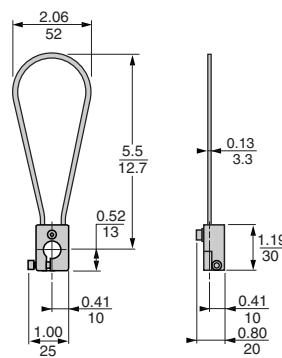
a, b, c: page 6/31

Rod type lever arms

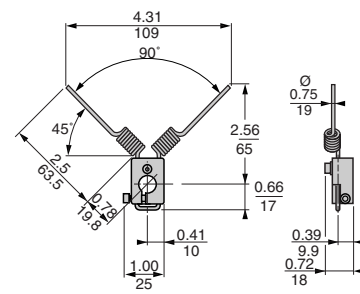
9007FA1

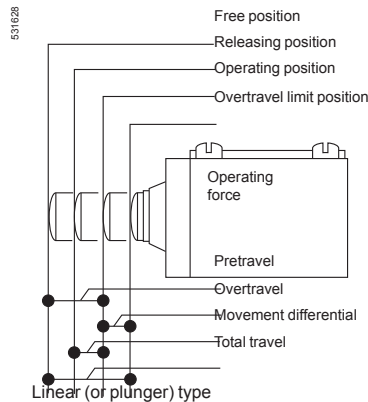
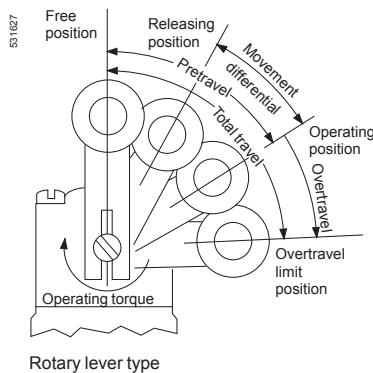


9007FA6



9007LA19





6

Glossary

CCW—Counterclockwise only (for lever types).

CW—Clockwise only (for lever types).

Differential—The distance or angle from the operating position to the releasing position. Also known as movement differential.

Free or normal position—The initial position of the actuator when there is no external force (other than gravity) applied on the actuator.

Neutral position—Lever operated switch with a minimum of two contacts. One contact changes state only when lever moves CW. The second contact changes state only when the lever moves CCW. (The center position is the free position.)

Operating position—The position of the actuator at which the contacts change state.

Overtravel—The distance or angle through which the actuator moves when traveling from the operating position to the overtravel limit position.

Pre-travel—The distance or angle through which the actuator moves from the free position to the position at which the contacts change state, the operating position.

Release position—The position of the actuator at which the contacts change state from the operated contact position to the normal contact position.

Release torque—The value to which the torque on the actuator must be reduced to allow the contacts to change state from the operated position to the normal contact position.

Actuator-lever—An actuator is the mechanism of the switch or enclosure that, when moved as intended, operates the contacts.

Maintained contact limit switch—A switch that remains in a given condition until actuated to another condition, which is also maintained until further actuation.

Momentary contact limit switch—A switch that returns from the operated condition to its free or normal circuit condition when the actuating force is removed.

N.C.—Normally closed contact, when the switch mechanism is at its free or normal position.

N.O.—Normally open contact, when the switch mechanism is at its free or normal position.

Operating torque—The minimum torque (force) value which must be applied to the actuator to cause the contacts to change state.

Overtravel limit position—The position of the actuator beyond which further overtravel would cause damage to the switch or actuator.

Repeatability—The ability to consistently maintain the original operating characteristics. Measured by the difference between the operating position of a new switch and of the same after 1 million operations.

Total travel—Total travel is the sum of the pre-travel and overtravel.

Travel—Movement of the actuator from its free or normal position when force is applied. (See pre-travel and over travel.)

Glossary (continued)

Definition of limit switch terms

There are many terms common to position switches that are not used with other control devices. Be sure you understand the definitions of these commonly-used terms, as these terms are used throughout this document.

Limit switch—A device that converts a mechanical motion into an electrical control signal.

Actuator—The mechanism of a limit switch that operates the contacts, i.e., lever arm, plunger, wobble stick.

Cam—A machine part or component that applies force to the switch actuator causing it to move as intended. Also known as “dog”.

Cam track dimension—The distance from the switch mounting surface to some point on the roller or actuator.

Differential—The distance that the limit switch actuator moves, from the trip point to the reset point of the contacts.

Direct-acting/positive opening contacts—Normally closed contacts that are moved directly by the operating shaft. They are slow make-slow break contacts and have a shorter life than snap action contacts due to longer arcing times. In general, these should only be used where movement of actuator must break welded contacts, as in a crane safety limit switch. (Snap action positive opening contacts are available in the Telemecanique® XCKJ limit switch.)

Maintained contacts—Contacts that remain in the tripped position until the return travel of the cam moves the switch actuator back and resets the contacts.

Neutral (free or normal) position limit switch—A lever arm type switch with two sets of contacts. One set operates when the shaft is rotated clockwise; the other operates when the shaft is rotated counterclockwise.

Operating force—The force required to move the limit switch actuator to cause the contacts to change state.

Overtravel—The distance that the position switch actuator may move beyond the trip point, (see “Contact travel” figure at left) without damage to the switch.

Pole—The number of moveable contacts in a switching mechanism. A single pole device may be 1 N.O., 1 N.C. or 1 N.O. and 1 N.C. with a single set of moveable contacts used to bridge those stationary contacts. A double or two pole switch has two moveable contacts.

Positive break contacts—Normally closed contacts with a special mechanism to ensure opening. Can be snap acting positive break or direct acting slow make, slow break type. The slow break direct acting type is not recommended for high cycle applications due to shorter life.

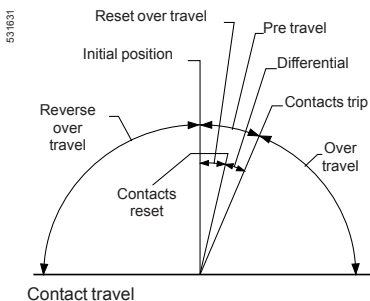
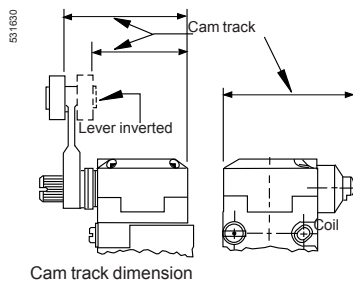
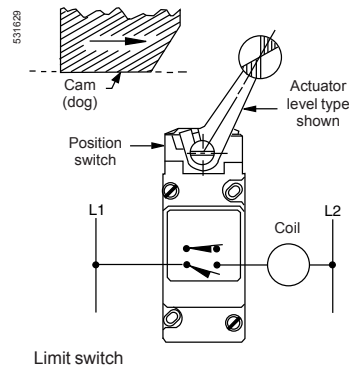
Pre-travel—The distance that the limit switch actuator must move to trip the contacts.

Reed contacts—A mechanism consists of a set of contacts hermetically sealed in a glass envelope and actuated by a magnet attached to the operator. This sealed construction keeps contaminants out of the contact area, making the reed switch ideal for low voltage, low current circuits such as programmable controllers.

Reset point—The position of the actuator at which the contacts return to the normal position.

Snap action contacts—Contacts that move rapidly to open or closed position and are relatively independent of cam speed. Because of shorter arcing times, snap acting contacts have longer contact life than slow make and break contacts and should be used where fast moving cams are encountered or where good repeat accuracy is required.

Spring return—Contacts that return to their original position when the actuating force is removed.



Glossary (continued)

Slow break contacts—The speed of transfer of the moveable contacts depends on the speed of the operator. The amount of travel of the moveable contacts is also dependent on the amount of travel by the operator. Slow make and break contacts have the same trip and reset points, and do not have the differential travel common to snap switches.

Snap action contacts—The speed of transfer of the moveable contacts is not dependent on the speed of the operator. The amount of travel of the moveable contacts is also not dependent on the amount of travel by the operator. The movement of the moveable contacts are determined by a preset travel, after this point is reached, the contacts will trip. Snap action contacts have different trip and reset points, the difference is identified as “differential.”

Flexible operators—Flexible resilient or elastic operators, i.e., wobble sticks, do not ensure direct opening/positive opening action.

Isolated contacts—Single-pole double-throw (SPDT) contacts with four terminals which have two isolated contact bars mechanically linked. No polarity restrictions apply. Different (isolated) power supplies can also be applied.

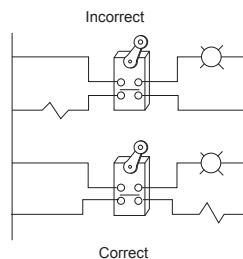
Same polarity—Single-pole double throw (SPDT) contacts with four terminals that require the supply to be applied with the same polarity (i.e., L1 or +) on the same side of the contact bar. Two different supplies are not allowed in this configuration. (The loads should always be on the same side of the contact bar.)

Direct opening contact (also known as positive opening contacts)—A normally closed contact element coupled with the switch actuator via a non-resilient (non-elastic) member so that full contact opening is obtained when the actuator is moved through the direct opening travel by applying a direct opening force. The contact element will shear open in the event of sticking contacts or broken springs. Proper fusing of the control circuit is required. Direct opening contacts meet IEC 60947-5-1 requirements.

Direct opening travel (also known as positive opening travel)—Minimum travel from the actuator free position to the position where the direct opening operation is completed. Usually longer than the normal pre-travel.

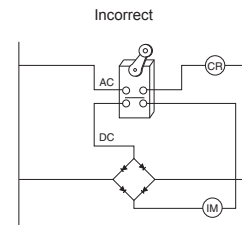
Polarity

Opposite polarities should not be connected to the contacts of one limit switch unless the limit switch is specifically designed for such service (isolated contacts—no polarity). See page 6/13.

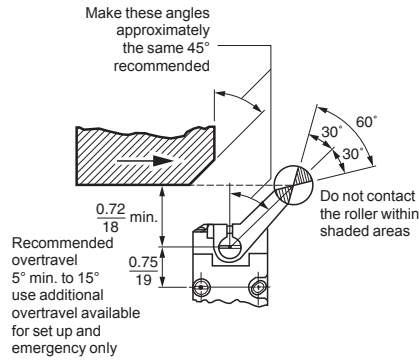


Power sources

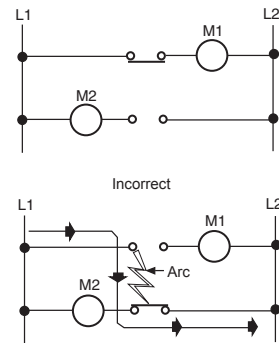
Power from different sources should not be connected to the contacts of one limit switch unless the switch is specifically designed for such service (isolated contacts—no polarity).



531632

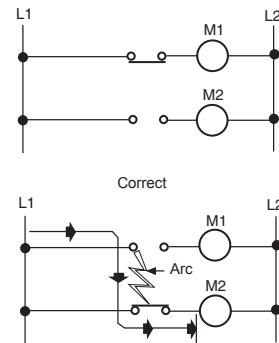


531633



Contacts connected to opposite polarities. Line to line short (bold line) can occur through arc drawn when contacts operate.

531634



Contacts connected to same polarity. Line to line short cannot occur when contacts operate.

Overriding cams

The cam trailing edge on overriding cams must also be considered for maximum switch life (see figure at left). Lever arm snap back causes shock loads which reduce switch life. Also, with reversing cams the trailing edge becomes a leading edge on the return stroke. The overtravel of the limit switch should not be exceeded, but 5° minimum to 15° travel past the trip point is recommended. Additional travel should only be used for set up and emergencies. Cam design procedures for limit switches with other than lever arm actuators vary from switch type to switch type and are discussed along with other limit switch application design suggestions in additional literature "Proper Application of Limit Switches" (SM444).

Contacts

- Make sure the electrical load is within limit switch contact ratings.
- The single pole, double throw contacts of a snap switch used in a limit switch should not be used on opposite polarities. When load M1 is connected between the contact and line L2, and load M2 is connected between the other contact and line L1 (see "Contacts connected to opposite polarities" at left), a line-to-line short (bold line) can occur through the arc, which may be drawn as the contacts operate. When contacts are connected to the same polarity (see figure below, left), this line-to-line short cannot occur.
- The same result can occur if different power sources are connected to the single-pole, double-throw contacts of a snap switch.

Coolant

- When possible, avoid mounting limit switches where they will be constantly exposed to coolant, chips, etc. Although designed for such applications, switches last longer when not exposed to these contaminants.
- Make sure cover screws are tightened to ensure a good oiltight seal.
- When possible, avoid using fire-resistant coolants of the phosphate ester type. Equipment exposed to these coolants requires special seals and gaskets. Fluoroelastomer, resistant to these types of coolants, is the standard shaft seal material on Type C lever arm types. If required, all gaskets, as well as boots on plunger types, can be furnished in fluoroelastomer material.

Recommendations for conduit installation

Limit switch leakage is often traced to the conduit system. Coolant or condensation in the conduit line can enter the switch through the conduit entry. Oil tightness depends on the condition of the conduit connection and seal. Recommendations for installing conduit to position switches are as follows:

- To ensure an oiltight seal, use thread sealant and a conduit seal or a sealing bushing around the conduit fitting. Otherwise, the fitting probably will leak.
- Limit switches should be installed with the conduit end down whenever possible.
- If condensation or moisture is present inside the conduit, a Square D® conduit seal can be inserted into the conduit entry. The conduit fitting can then be connected in the normal manner. Thread sealant and a sealing bushing must still be used.
- Often a junction box fills with coolant and/or condensation, which backs up into the position limit through the conduit. A simple solution is to drill a hole in the bottom of the junction box to allow the liquid to drain out.
- If conduit leakage is severe, pre-wired and potted position limit (Forms Y184• and Y185•) should be used. The switches are pre-wired with either individual wires or multiconductor STOWA cord, and the receptacle is sealed with a potting material.
- The Square D limit switch is available with a pre-wired male plug receptacle. The connector provides an effective oiltight seal when used with the appropriate female connector cord.

6

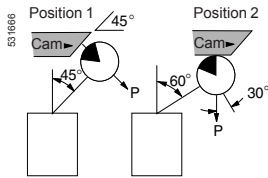


Figure 1A cam design for speeds up to 50 fpm

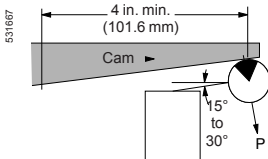


Figure 1B cam design for speeds from 50 to 200 fpm (15.2 to 60.9 mpm).

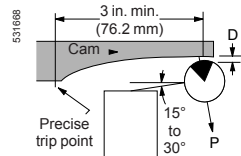


Figure 1C cam design for speeds from 200 to 400 fpm (60.9 to 121.9 mpm).

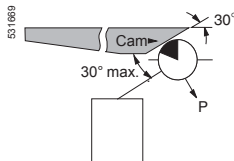


Figure 2

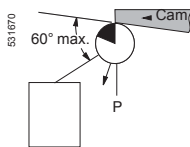


Figure 3

Application information

Excessive impact from improperly designed actuating systems is without question the leading cause of premature failure of the electromechanical limit switch. At slow speed, impact is rarely troublesome, but as speed increases, impact applied to the switch becomes a critical problem. In today's higher speed machines, therefore, it is important to give proper consideration to correctly designed actuating systems.

These recommendations are designed to assist you in obtaining greater life from your limit switches. The black sector in the roller indicates the recommended design limits of the angle of pressure shown in the illustrations as "P". Three main design and installation considerations are:

- The pressure applied by the actuating mechanism to switch operating lever should approximate direction of lever rotation with a variation not to exceed 30°.
- Since the angle of pressure changes drastically with rotation of the lever, the cam must be designed for proper pressure angles at all positions of the lever travel.
- The switch operating levers should be positioned as nearly parallel with the leading edges of the cams as possible.

Considering these three factors:

- The cam in Figure 1A is satisfactory for speeds up to 50 fpm (15.2 mpm)
- The cam in Figure 1B is suitable for speeds up to 200 fpm (60.9 mpm) (nonuniform acceleration of switch lever)
- The cam in Figure 1C is satisfactory for speeds up to 400 fpm (121.9 mpm) (uniform or other controlled acceleration)

Designing proper pressure angles for overriding cams for electromechanical limit switches

Don't underestimate the importance of adjusting the cams and operating levers in electromechanical limit switches to provide the proper pressure angles in every travel position. Without the means to control the angle of pressure or the limit of override, the operating lever may spring back with damaging results. Lever flyback usually causes double pulsing of the contacts, and places additional stresses on the mechanical system of the limit switch. The excessive impacts absorbed from inadequately designed actuating devices eventually leads to abnormal wear and premature failure of the limit switch.

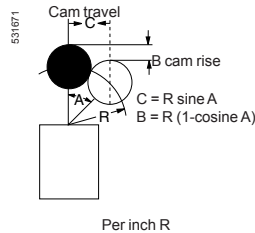
By looking closely at the actuating angles of the cam surface, designers and engineers can obtain the maximum operating life from electromechanical limit switches. The following recommendations help provide a workable knowledge of proper lever and cam angles—and how they are applied to secure optimum conditions:

- Actuating cam on machinery or slide should provide a trailing edge so that upon overriding the operating lever will not snap back.
- During the approach phase, the pressure angle of the cam should not vary from the lever angle more than 30°.
- On the override phase, **the angle of the trailing edge of the cam to the lever should be no more than 60°.**

If these guidelines are followed, the switch operating levers will always be approximately parallel with the leading edges of the actuating surfaces or cams.

Figure 2 shows leading edge of a cam about to press and actuate the electromechanical limit switch. The black sector of the roller indicates the recommended design limits of the angle of pressure shown in drawings as "P".

Figure 3 shows operating lever roller following the trailing edge of the cam on the override cycle. Unless a one-way lever is used, the cam will operate the switch on the return cycle.



Application information (continued)

The table below can assist the designer of machine tools and conveyors, the plant engineer, or the maintenance personnel responsible for keeping this equipment in a satisfactory operating condition.

The design engineer will find the table useful in making trouble-free cam layouts. For example, if the recommended operating travel for a switch is between 15° and 30°, use the table to figure cam rise and travel. This aids in determining what type of cam to design, its dimensions, etc.

The plant engineer can use the table to determine where to position levers on replacement switches or revamped circuitry to operate existing cams. The engineer can also use the table to position the lever in proper relationship to the cam, and to find out whether switches and cams are installed properly to obtain maximum switch life.

All dimensions in the table are for 1 in. (25.4 mm) levers. If you use longer levers, multiply the figures by the increased lever length. For example, for a 2 in. (50.8 mm) lever, use the multiplier 2.

All limit switches have a recommended operating travel and for best performance should be installed within these limits. (1)

Dual dimensions: in. (mm)

A	B	C	A	B	C
1°	0.0002 (0.005 mm)	0.017 (0.43 mm)	46°	0.305 (7.7 mm)	0.719 (18.2 mm)
2°	0.0006 (0.015 mm)	0.035 (0.89 mm)	47°	0.318 (8.1 mm)	0.731 (18.6 mm)
3°	0.0014 (0.035 mm)	0.052 (1.3 mm)	48°	0.331 (8.4 mm)	0.743 (18.9 mm)
4°	0.002 (0.05 mm)	0.070 (1.8 mm)	49°	0.344 (8.7 mm)	0.755 (19.2 mm)
5°	0.004 (0.101 mm)	0.087 (2.2 mm)	50°	0.357 (9.0 mm)	0.766 (19.4 mm)
6°	0.005 (0.127 mm)	0.105 (2.6 mm)	51°	0.371 (9.4 mm)	0.777 (19.7 mm)
7°	0.007 (0.178 mm)	0.122 (3.1 mm)	52°	0.384 (9.7 mm)	0.788 (20.0 mm)
8°	0.010 (0.254 mm)	0.139 (3.5 mm)	53°	0.398 (10.1 mm)	0.799 (20.3 mm)
9°	0.012 (0.304 mm)	0.156 (4.0 mm)	54°	0.412 (10.4 mm)	0.809 (20.5 mm)
10°	0.015 (0.381 mm)	0.174 (4.4 mm)	55°	0.426 (11.0 mm)	0.819 (20.8 mm)
11°	0.018 (0.457 mm)	0.191 (4.8 mm)	56°	0.441 (11.2 mm)	0.829 (21.0 mm)
12°	0.022 (0.559 mm)	0.208 (5.3 mm)	57°	0.455 (11.5 mm)	0.839 (21.3 mm)
13°	0.026 (0.660 mm)	0.225 (5.7 mm)	58°	0.468 (12.3 mm)	0.857 (21.7 mm)
14°	0.030 (0.762 mm)	0.242 (6.1 mm)	59°	0.485 (12.3 mm)	0.857 (21.7 mm)
15°	0.034 (0.863 mm)	0.259 (6.6 mm)	60°	0.500 (12.7 mm)	0.866 (22 mm)
16°	0.039 (0.990 mm)	0.276 (7.2 mm)	61°	0.515 (13.1 mm)	0.875 (22.2 mm)
17°	0.044 (1.12 mm)	0.292 (7.4 mm)	62°	0.531 (13.5 mm)	0.883 (22.4 mm)
18°	0.049 (1.24 mm)	0.309 (7.8 mm)	63°	0.546 (14.0 mm)	0.891 (22.6 mm)
19°	0.054 (1.37 mm)	0.326 (8.3 mm)	64°	0.562 (14.3 mm)	0.899 (22.8 mm)
20°	0.060 (1.52 mm)	0.342 (8.7 mm)	65°	0.577 (14.6 mm)	0.906 (23.0 mm)
21°	0.066 (1.67 mm)	0.358 (9.1 mm)	66°	0.593 15.0(mm)	0.914 (23.2 mm)
22°	0.073 (1.85 mm)	0.375 (9.5 mm)	67°	0.609 15.5(mm)	0.921 (23.4 mm)
23°	0.079 (2.00 mm)	0.391 (9.9 mm)	68°	0.625 (16.0 mm)	0.927 (23.5 mm)
24°	0.086 (2.2 mm)	0.407 (10.3 mm)	69°	0.642 (16.3 mm)	0.934 (23.7 mm)
25°	0.094 (2.38 mm)	0.423 (10.7 mm)	70°	0.658 (16.7 mm)	0.940 (23.9 mm)
26°	0.101 (2.56 mm)	0.438 (11.1 mm)	71°	0.674 (17.1 mm)	0.946 (24.0 mm)
27°	0.109 (2.77 mm)	0.454 (11.5 mm)	72°	0.691 (17.5 mm)	0.951 (24.1 mm)
28°	0.117 (2.9 mm)	0.469 (12 mm)	73°	0.708 (18.0 mm)	0.956 (24.3 mm)
29°	0.125 (3.17 mm)	0.485 (12.3 mm)	74°	0.724 (18.4 mm)	0.961 (24.4 mm)
30°	0.134 (3.40 mm)	0.500 (12.7 mm)	75°	0.741 (19.0 mm)	0.966 (24.5 mm)
31°	0.143 (3.6 mm)	0.515 (13.1 mm)	76°	0.758 (19.2 mm)	0.970 (24.6 mm)
32°	0.152 (3.9 mm)	0.530 (13.4 mm)	77°	0.775 (20.0 mm)	0.974 (24.7 mm)
33°	0.161 (4.1 mm)	0.545 (14.0 mm)	78°	0.792 (20.1 mm)	0.978 (24.8 mm)
34°	0.171 (4.3 mm)	0.559 (14.2 mm)	79°	0.809 (20.5 mm)	0.982 (24.9 mm)
35°	0.181 (4.6 mm)	0.574 (14.6 mm)	80°	0.826 (21.0 mm)	0.985 (25.0 mm)
36°	0.191 (4.8 mm)	0.588 (15 mm)	81°	0.844 (21.4 mm)	0.988 (25.1 mm)
37°	0.201 (5.1 mm)	0.602 (15.3 mm)	82°	0.861 (21.8 mm)	0.990 (25.1 mm)
38°	0.212 (5.4 mm)	0.616 (15.6 mm)	83°	0.878 (22.3 mm)	0.993 (25.2 mm)
39°	0.223 (5.7 mm)	0.629 (16.0 mm)	84°	0.895 (22.7 mm)	0.995 (25.3 mm)
40°	0.234 (6.0 mm)	0.643 (16.3 mm)	85°	0.913 (23.2 mm)	0.996 (25.3 mm)
41°	0.245 (6.2 mm)	0.656 (16.6 mm)	86°	0.930 (23.6 mm)	0.9976 (25.3 mm)
42°	0.257 (6.5 mm)	0.669 (17.0 mm)	87°	0.948 (24.0 mm)	0.9986 (25.4 mm)
43°	0.269 (6.8 mm)	0.682 (17.3 mm)	88°	0.965 (24.5 mm)	0.9994 (25.4 mm)
44°	0.281 (7.1 mm)	0.695 (17.6 mm)	89°	0.983 (25.0 mm)	0.9999 (25.4 mm)
45°	0.293 (7.4 mm)	0.707 (18 mm)	90°	1.000 (25.4 mm)	1.000 (25.4 mm)

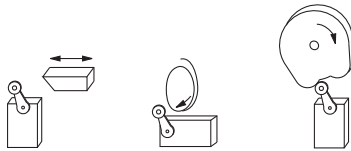
1. Refer to document SM444R1 for additional information regarding cam speed and angles.

Lever actuators

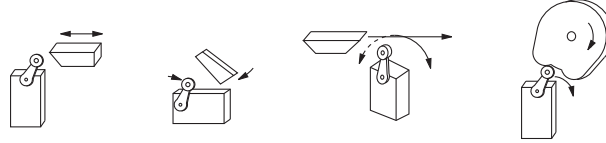
For limit switches with lever actuators, the actuating force should be applied as nearly perpendicular to the lever as practical and perpendicular to the shaft axis about which the lever rotates.

Proper installation

Correct



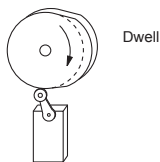
Incorrect



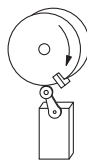
Dwelling requirements

Where relatively fast motions are involved, the cams should be so designed that the limit switch will be held operated long enough to operate relays, valves, etc.

Correct



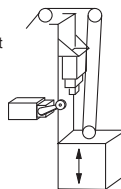
Incorrect



Overtravel limitations

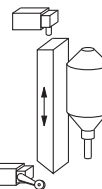
Operating mechanisms for limit switches should be so designed that, under any operating or emergency conditions, the limit switch is not operated beyond its overtravel limit position. A limit switch should not be used as a mechanical stop.

Incorrect



Correct

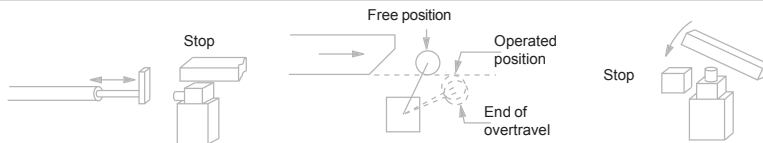
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Correct



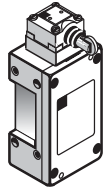
Correct



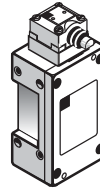
Hazardous non-plug-in body type (1)

With head for linear movement

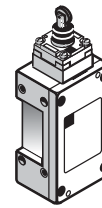
Side plunger



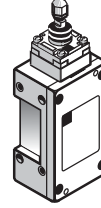
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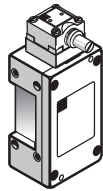
Top plunger



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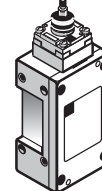


With head for rotary movement (lever)

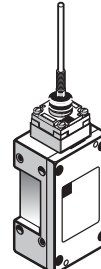


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With head for multi-directional movement



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(1) Factory modifications: see pages 6/31 to 6/35.

Application information—hazardous locations (2)

Classification of hazardous locations

Hazardous locations are those areas that **may** have flammable gases or combustible dusts present in quantities sufficient to produce an explosive or ignitable mixture. These gases, dusts, may always be present or may only be present in abnormal situations. The National Electrical Code (NEC) describes these areas in Articles 500 through 503 and divides them into three types of categories: Class, Group, Division.

- Classes
The Classes (I, II, III) differentiate between the type of hazardous materials: I is for gases, II is for dusts, and III is for fibers.
- Groups
The Groups (A, B, C, D, E, F, and G) further subdivide each class according to the relative explosive force of the materials. Group A atmosphere is acetylene which has a higher explosive force than Group B (which may contain hydrogen, for example); and Group B has a higher explosive force than Group D, etc.
- Divisions
The Divisions (1 and 2) refer to the presence of these hazardous gases and dusts. Division 1 areas can have these gases or dusts present **at all times** under **normal operating conditions** in an ignitable concentration. Division 2 areas **only** have **ignitable concentrations** of dusts or gases present during **abnormal conditions**, such as machine failures or container breakage.

The table below summarizes the classifications described above.

Summary of classification chart		
Class	Division	Group
I. Gas	1. Hazard May Exist May Exist In Atmosphere Under Normal Operating Conditions	A. Acetylene B. Manufactured Gases Containing Hydrogen C. Petrochemicals (e.g. ethylene) D. Petrochemicals (e.g. alcohol)
	2. Potential Hazard A. May be present in atmosphere only under abnormal circumstances.	A. Acetylene B. Manufactured Gases Containing Hydrogen C. Petrochemicals (e.g. ethylene) D. Petrochemicals (e.g. alcohol)
II. Dust	1. Hazard May Exist May Exist In Atmosphere Under Normal Operating Conditions	E. Conductive and Combustible Dust (Resistivity $\leq 10^2$ ohms/cm) F. Carbonaceous Dusts (Resistivity $> 10^2$ ohm/cm but $< 10^8$ ohm/cm) G. Non-Conductive Combustible Dust (Resistivity $> = 10^5$ ohms/cm)
	2. Potential Hazard A. May be present in atmosphere only under abnormal circumstances.	G. Non-Conductive Combustible Dust (Resistivity $> = 10^5$ ohms/cm)
III. Fibers	1. Production Areas	Easily Ignitable Fibers
	2. Handling and Storage Areas	Easily Ignitable Fibers

(2) Not ATEX rated

Limit switches

Class 9007C heavy duty industrial, hazardous locations
Non-plug-in body, metal

Environmental specifications

Conforming to standards	Products	NEMA 250, EN 60947-1, EN 60947-5-1, IEC 60947, UL 508, C22-2-14-95, CE conformity documentation
	Machine assemblies	IEC 60204-1
Product certifications		UL, CSA, CE
Protective treatment		Epoxy powder coat
Ambient air temperature (Lever/rotary head)	Operation	-20 to +185 °F (-29 to +85 °C), wider range available
	Storage	-20 to +185 °F (-29 to +85 °C), wider range available
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10–150 Hz, 11 ms) (C86F switch good for 18.5g only)
Shock resistance	Conforming to IEC 60068-2-27	60 gn (9 ms)
Electric shock protection	Conforming to IEC 61140	Class 0
Degree of protection	Conforming to IEC 60529	IP 67
Cable entry or connector	Depending on model	1/2-14 NPT, M20 X 1.5, ISO cable entry, 5-pin mini connector, 4-pin micro connector
Materials	Bodies, heads, levers	Bodies in aluminum, heads in Zamak zinc alloy, levers and rods in zinc, steel, stainless steel, acetal resin.

Contact block specifications

Rated operational characteristics hard contacts -AC voltage	9007CR53 (single pole)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CR61 (two pole)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CR65 (two pole two stage)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CR67 (two pole neutral)	NEMAA600 (Ue = 600 V, Ie = 1.2 A); Ithe = 10 A
	9007CR53 (single pole)	NEMA Q600 (Ue = 600 V, Ie = 0.1 A); Ithe = 2.5 A
Rated operational characteristics hard contacts -DC voltage	9007CR61 (two pole)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CR65 (two pole two stage)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
	9007CR67 (two pole neutral)	NEMA R300 (Ue = 250 V, Ie = 0.11 A); Ithe = 1.0 A
Rated insulation voltage		600 V
Rated impulse withstand voltage		2,500 Vac for 1 minute for CE; 2,200 Vac for 1 minute for UL; and 2,640 Vac for 1 s for CSA
Positive opening	Form Y1561	⊖
Short circuit protection (customer-supplied)		10 A Bussmann Class CC KTK-R-10 fuse non-time-delay
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum
Maximum actuation speed		50 fpm / 90 fpm (15.2 m/min / 27.4 m/min) with 45 degree cam angle, levers only
Electrical durability		1 million operating cycles

Types of contact elements

IEC 60947-5-1			NEMA			JIS		
Form	Symbol	Description	Form	Symbol	Description	Form	Symbol	Description
A		Single break	A		—	3		Double break
X			B		—	2		Double break
B		Single break	C		—	1		Single break
Y			Z		Same polarity only			Double break
C		—						
Za		Same polarity						
Zb		Electrically separate						

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Limit switches

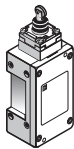
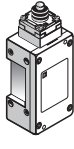
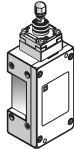
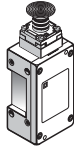
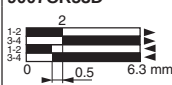
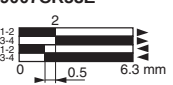
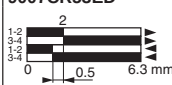
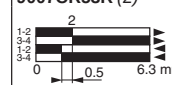
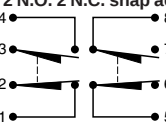
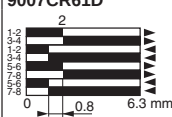
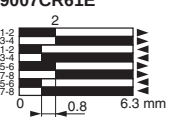
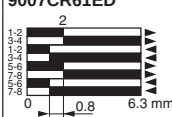
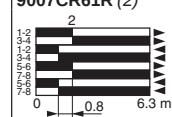
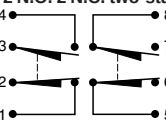
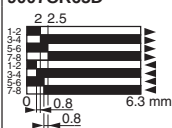
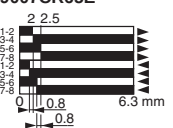
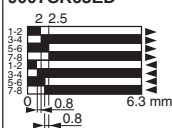
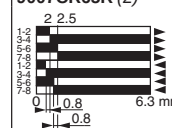
Class 9007C heavy duty industrial, hazardous locations
Non-plug-in body, metal

Type of head		Side plunger (mounting by the body)			
Hazardous location non-plug-in body type					
Type of operator		Side roller plunger spring return vertical roller (1)	Side push rod plunger spring return	Side push rod plunger adjustable (2) spring return	Side push rod plunger maintained contact
Catalog numbers					
1 N.O. 1 N.C. snap action		 9007CR53F	 9007CR53G	 9007CR53GD	 9007CR53H
2 N.O. 2 N.C. snap action		 9007CR61F	 9007CR61G	 9007CR61GD	 9007CR61H
2 N.O. 2 N.C. two-stage snap action		 9007CR65F	 9007CR65G	 9007CR65GD	
Weight, kg (lb)		1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation		contact closed contact open			
Specifications (nominal operating data)					
Switch actuation		On end			
Type of actuation					
Pre-travel		2 mm (0.08 in.)			3.6 mm (0.14 in.)
Pre-travel two stage		First stage 2 mm (0.08 in.)			
		First stage to second stage 0.5 mm (0.02 in.)			
Total travel		6.3 mm (0.25 in.)			
Differential		0.8 mm (0.03 in.)			
Reverse overtravel		—			
Minimum force or torque 1 pole & 2 pole		4 lb (17.8 N)			7 lb (31.1 N)
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)		0.03 mm (0.001 in.)			—
Conduit entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			
(1) Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter H at the end of the equivalent vertical roller version type.					
(2) To lock the nut in the desired position, crimp the slot near the bottom of the nut.					

(1) Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter H at the end of the equivalent vertical roller version type.
(2) To lock the nut in the desired position, crimp the slot near the bottom of the nut.

Limit switches

Class 9007C heavy duty industrial, hazardous locations
Non-plug-in body, metal

Type of head		Top plunger (mounting by the body)			
Hazardous location non-plug-in body type					
Type of operator		Top roller plunger spring return	Top push rod plunger spring return	Top push rod plunger adjustable (1) spring return	Palm operated (2)
Catalog numbers					
1 N.O. 1 N.C. snap action 		9007CR53D 	9007CR53E 	9007CR53ED 	9007CR53R (2) 
2 N.O. 2 N.C. snap action 		9007CR61D 	9007CR61E 	9007CR61ED 	9007CR61R (2) 
2 N.O. 2 N.C. two-stage snap action 		9007CR65D 	9007CR65E 	9007CR65ED 	9007CR65R (2) 
Weight, kg (lb)		1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation		 contact closed  contact open			
Specifications (nominal operating data)					
Switch actuation		On end			
Type of actuation		 			
Pre-travel		2 mm (0.08 in.)			
Pre-travel two stage		2 mm (0.08 in.)			
		First stage to second stage 0.3 mm (0.01 in.)			
Total travel		6.3 mm (0.25 in.)			
Differential		0.5 mm (0.02 in.)			
Reverse overtravel		—			
Minimum force or torque		1 pole & 2 pole 3 lb (13.3 N)		7 lb (31.1 N)	
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum			
Repeatability (linear travel of cam)		0.03 mm (0.001 in.)			
Conduit entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry			

- (1) To lock the nut in the desired position, crimp the slot near the bottom of the nut.
(2) Does not include mushroom button. Must be ordered separately; see below.

Available operators

Description	Diameter in. (mm)	Color	Catalog number	Weight kg (lb)
Mushroom button for palm operated turret head	1.38 (35)	Black	2358C6G3	0.03 (0.06)
		Red	2358C6G2	0.03 (0.06)
		Green	2358C6G6	0.03 (0.06)
		Yellow	2358C6G8	0.03 (0.06)
	2.25 (57.2)	Black	—	—
		Red	2358C22G3	0.05 (0.10)
		Green	2358C22G6	0.05 (0.10)
		Yellow	2358C22G8	0.05 (0.10)

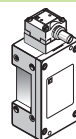
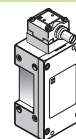
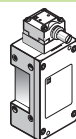
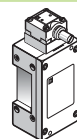
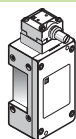
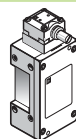
Limit switches

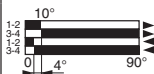
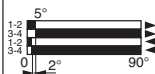
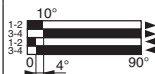
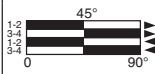
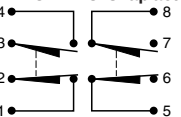
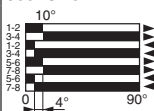
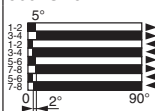
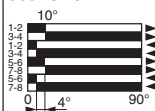
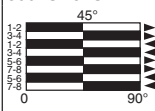
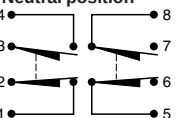
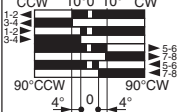
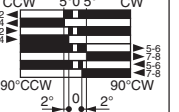
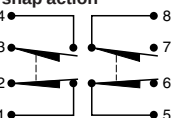
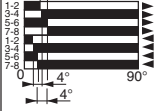
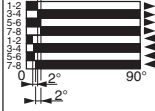
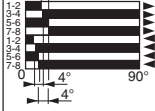
Class 9007C heavy duty industrial, hazardous locations
Non-plug-in body, metal

Type of head

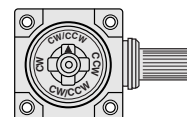
Rotary (lever arm type) (1)

Hazardous location
non-plug-in body type



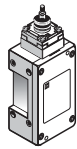
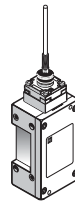
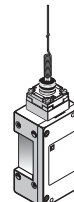
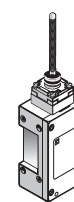
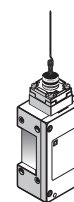
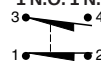
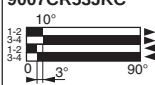
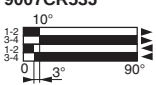
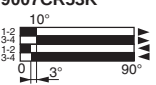
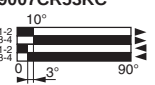
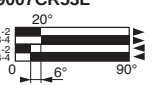
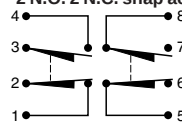
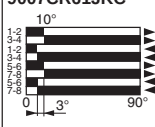
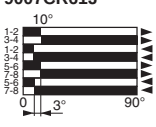
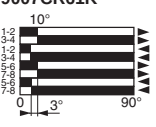
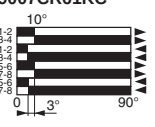
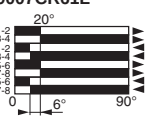
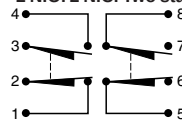
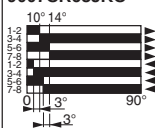
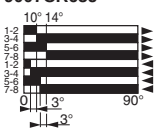
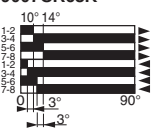
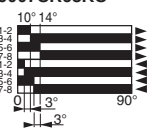
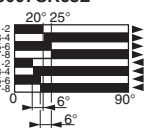
Type of operator	Standard pre-travel spring return	Low differential spring return	Neutral position		Light operating torque spring return	Maintained contact
Type of direction	CW & CCW (2)	CW & CCW (2)	CW & CCW	CW & CCW	CW & CCW (2)	CW (trip) CCW (reset)
Catalog numbers						
1 N.O. 1 N.C. snap action 	9007CR53B2 	9007CR53A2 			9007CR53N2 	9007CR53C 
2 N.O. 2 N.C. snap action 	9007CR61B2 	9007CR61A2 			9007CR61N2 	9007CR61C 
2 N.O. 2 N.C. snap action Neutral position 			9007CR67T10 	9007CR67T5 		
2 N.O. 2 N.C. two stage snap action 	9007CR65B2 	9007CR65A2 			9007CR65N2 	
Weight, kg (lb)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation	 contact closed  contact open					
Specifications (nominal operating data)						
Switch actuation	By 30° cam 					
Type of actuation						
Pre-travel	10°	5°	10°	5°	10°	45°
Pre-travel two stage						
First stage	10°	5°	—	—	10°	—
First stage to second stage	2.5°	1.5°	—	—	2.5°	—
Total travel	90°					90°
Differential	4°	2°	4°	2°	4°	—
Reverse overtravel	90°					—
Operating torque/force 1 pole & 2 pole	4 lb-in (0.45 N•m)				25 oz-in (0.18 N•m)	3 lb-in (0.34 N•m)
Terminal wire sizes (cabling/screw clamp)	1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum					
Repeatability (linear travel of cam)	0.05 mm (± 0.002 in.)	0.03 mm (± 0.001 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)	0.05 mm (± 0.002 in.)
Conduit entry	1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry					

- Lever arm type must be ordered separately from page 6/44 to 6/46.
- These devices are factory set to operate the contacts in **both** the CW and CCW directions.
To order factory converted devices: For CCW only operation, change the 2 at the end of the Type number to 1 (for example: C54B2 becomes C54B1). For CW only operation, delete the 2 at the end of the Type number (for example, C54B2 becomes C54B).
Mode of operation of the lever arm is easily convertible to clockwise or both.
- Pull out and rotate the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW.



Limit switches

Class 9007C heavy duty industrial, hazardous locations
Non-plug-in body, metal

Type of head		Flexible operator (wobble stick)				
Hazardous location non-plug-in body type						
		Universal (1)	Wobble stick acetal resin extension (1)	Wobble stick wire extension (1)	Wobble stick coil spring extension (1)	Cat whisker
Type of operator		Catalog numbers				
1 N.O. 1 N.C. snap action 		9007CR53JKC 	9007CR53J 	9007CR53K 	9007CR53KC 	9007CR53L 
2 N.O. 2 N.C. snap action 		9007CR61JKC 	9007CR61J 	9007CR61K 	9007CR61KC 	9007CR61L 
2 N.O. 2 N.C. Two stage snap action 		9007CR65JKC 	9007CR65J 	9007CR65K 	9007CR65KC 	9007CR65L 
Weight, kg (lb)		1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)	1.020 (2.25)
Contact operation		 contact closed  contact open				
Specifications (nominal operating data)						
Switch actuation		By a moving object in a 180° hemisphere				
Type of actuation						
Pre-travel		10° (any direction)				20°
Pre-travel two-stage						
First stage		10° (any direction)				20°
First stage to second stage		4°				5°
Total travel		90°				
Differential		3				6°
Reverse overtravel		—				
Operating torque/force 1 pole & 2 pole		3 lb-in (0.34 N•m)				7 oz-in (0.05 N•m)
Terminal wire sizes (cabling/screw clamp)		1 or 2, 12–22 AWG (2.05–0.644 mm ²) wires maximum				
Repeatability (linear travel of cam)		—				
Conduit entry		1/2-14 NPT standard, optional M20 x 1.5 mm for ISO cable entry				

(1) Wobble stick extensions are available separately for the universal head or as replacements for complete devices). See below.

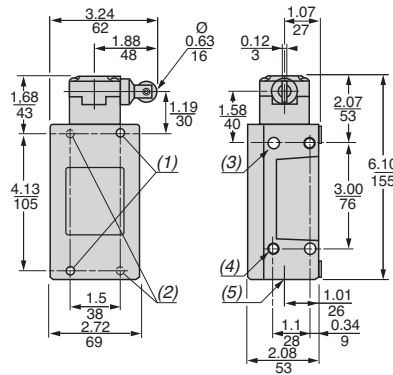
Description	Type of extension	Catalog number	Weight kg (lb)
Wobble stick extensions for the universal head, and as replacements for complete devices	Acetal resin extension	9007WJ	0.01 (0.03)
	Wire extension	9007WK	0.01 (0.02)
	Coil spring extension	9007WKC	0.02 (0.04)

Limit switches

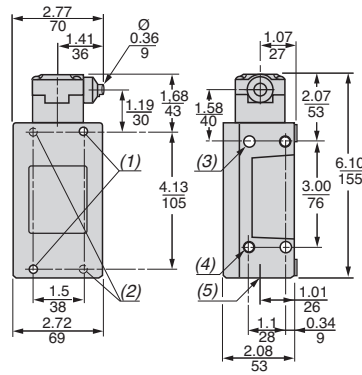
Class 9007C heavy duty industrial, hazardous locations
Non-plug-in body, metal

Side plunger

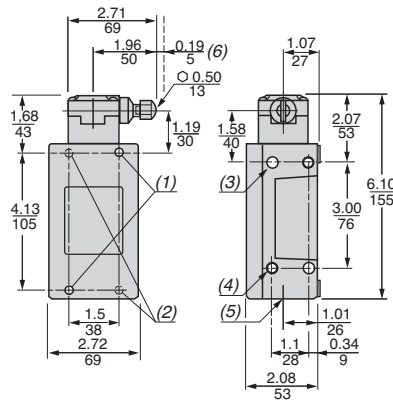
9007C••F



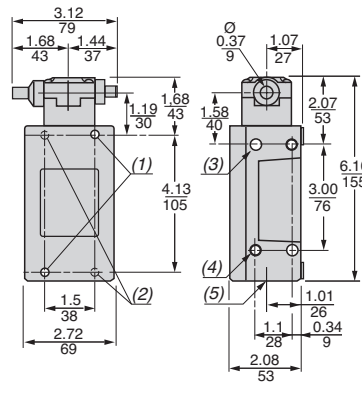
9007C••G



9007C••GD



9007C••H

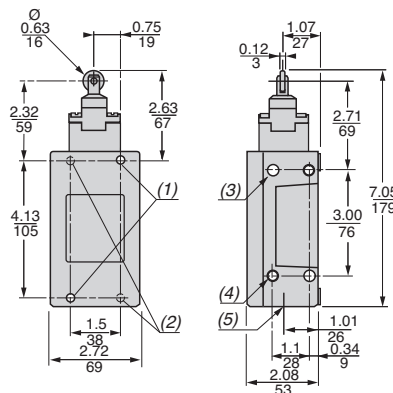


- (1) 2 x 0.27/7, front Mtg. holes.
- (2) 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
- (2) 2 x 0.26/7 dia. holes.
- (2) 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
- (2) 1/2 or 3/4 NPT.
- (2) Adjustable.

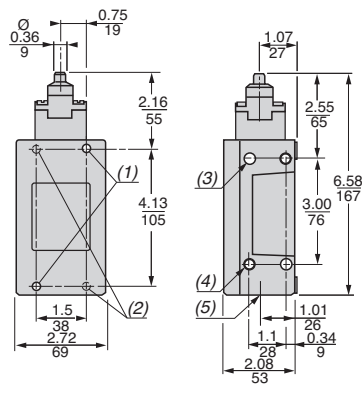
6

Top plunger

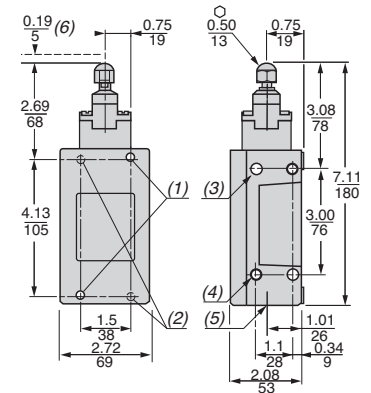
9007C••D



9007C••E



9007C••ED



- (1) 2 x 0.27/7, front Mtg. holes.
- (2) 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
- (2) 2 x 0.26/7 dia. holes, back Mtg. holes.
- (2) 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
- (2) 1/2 or 3/4 NPT.
- (2) Adjustable.

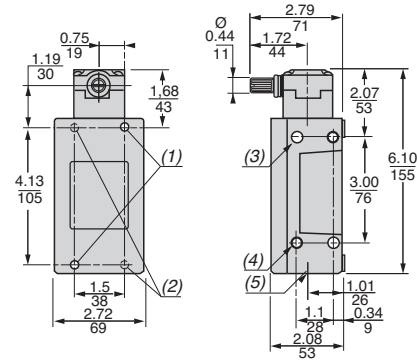
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

Limit switches

Class 9007C heavy duty industrial, hazardous locations
Non-plug-in body, metal

Rotary

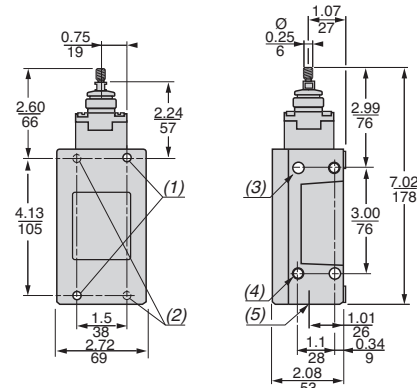
9007C***



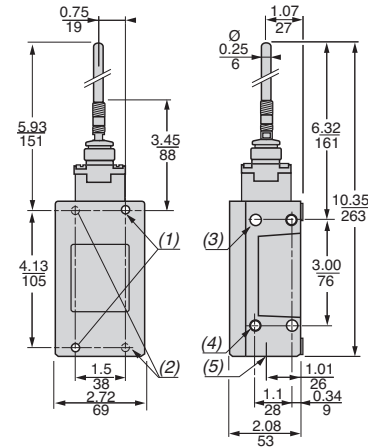
- (1) 2 x 0.27/7, front Mtg. holes.
- (2) 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
- (2) 2 x 0.26/7 dia. holes, back Mtg. holes.
- (2) 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
- (2) 1/2 or 1/4 NPT.

Wobble stick

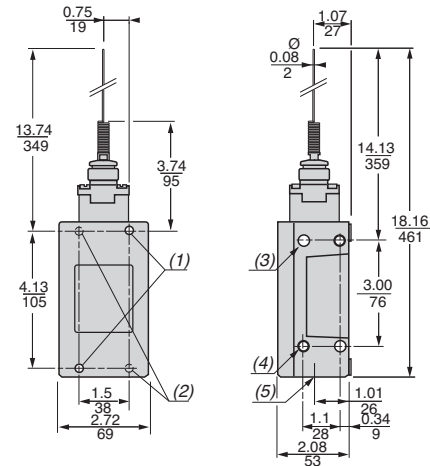
9007C**JKC



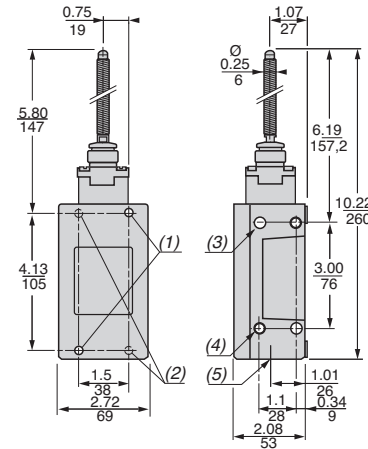
9007C**J



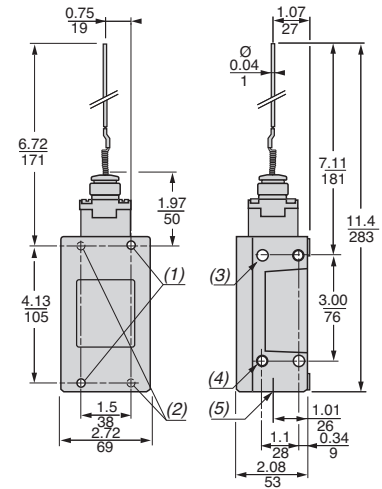
9007C**K



9007C**KC



9007C**L



- (1) 2 x 0.27/7, front Mtg. holes.
- (2) 2 x 0.63/16 1/4-20 DP UNC-2B back mounting holes.
- (2) 2 x 0.26/7 dia. holes, back Mtg. holes.
- (2) 2 1/4-20 UNC-2B, both sides 0.32/8 DP.
- (2) 1/2 or 1/4 NPT.

Dual dimensions: — in. —
mm

6

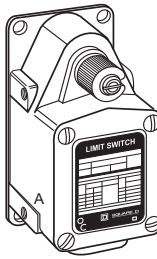
Description**9007T mill switches**

Use the 9007T mill switches instead of other limit switches in the following applications:

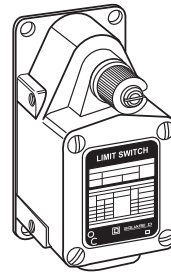
- Where the current load exceeds the typical heavy duty limit switch contact rating of 10 A and falls within the range of up to 20 A continuous.
- Where an operating sequence is required that is not possible on other limit switches. Fifteen sequences are available. The Universal type has twelve different operating sequences with CW only, CCW only and neutral position. The Standard type has three operating sequences with CW and CCW operation.
- Where higher reset forces are required due to foreign material interfering with lever arm operation, or where long heavy arms must reset against gravity.

9007FT foundry switches

The 9007FT foundry switches are for use in foundries or mills where the applications described above are required, and where falling foundry sand or similar material could build up and jam the operating mechanism. The shaft has a dust boot and extends from the switch case, preventing sand build up around the shaft. The devices can withstand hot falling sand and debris.

9007 (convertible sequence)**9007T mill switches**

Page 6/9

9007FT foundry switches

Page 6/4

Application information

Type T — Ideal for applications requiring extra heavy duty contact ratings, or higher operating and reset forces. Rugged mechanical construction with several different operating sequences in one basic switch.

Type FT — Designed specifically for rough foundry application. The shaft is entirely beyond the switch case to prevent jamming of the lever arm due to build up of sand. A dust boot is furnished as standard to further prevent sand packing and allow free movement of the lever arm. An extra long shaft bearing makes the switch extremely rugged and able to handle the rough applications encountered in foundries, mills, machine tool and similar industries. The switch will withstand hot falling sand up to 300° F (149° C).

Type T and FT

Enclosure — Oil-tight, dust-tight, water-tight, drip-tight meets NEMA Types 2, 4, and 13 requirements. Die cast zinc construction.

Operating sequences — Fifteen sequences available. The Universal type has 12 different operating sequences with CW only, CCW only, and neutral position operation. The Standard type has three operating sequences with CW and CCW operation. Various sequences will give quick make and break, spring return with maintained contact, or slow make and break. Most sequences are convertible by removing the base plate and adjusting the positioning plate and/or latches

Ambient temperature range — 10° F (-12.2° C) to 185° F (85° C) ambient at full rated load, up to 220° F (104° C) ambient with single coil load.

Lever arm — Die cast zinc construction with hardened, oil-impregnated, sintered iron rollers.

Conduit — 0.5 in. standard / 20 mm optional—Form M11

Mounting — Four baseplates provide end or side mounting holes and/or manifold mounting. All mounting holes are 0.25 in. (6.35 mm) diameter. Two tapped holes on each side of switch allow side mounting.

Contacts — SPDT (single pole, double throw), double break; and three point, double throw, single break.

- Silver contact tips.
- Phenolic contact block.
- Nylon liner.
- Polarity must be the same on double throw contacts.

Limit switches

Class 9007T and FT severe duty mill and foundry switches conforming to NEMA A600 and UL508

Environmental specifications

Conforming to standards	UL508
Product certifications	UL Listed, CSA Certified, CE Marked
Protective treatment	Corrosion resistant gray paint
Ambient air temperature	-10 to +185°F (-23 to +85°C) For Class 9007FT only, housing can withstand falling sand at +300°F (+149°C)
Vibration resistance	10G (10–55 Hz)
Shock resistance	30G
Electric shock protection	Class 0
Degree of protection	NEMA Types 1, 2, 4, 12, 13, IP65, 66, 67
Cable entry or connector	1/2" NPT (metric available)
Materials	Cast zinc (see Specifications table, below)

Contact block specifications

Rated operational specifications hard contacts	AC voltage	NEMA A600 Ithe = 20 A 20 A resistive and continuous
Rated operational specifications hard contacts	DC voltage	NEMA P 600 Ithe = 20 A 20 A resistive and continuous
Rated insulation voltage		600 V
Rated impulse withstand voltage		2,500 Vac for 1 minute for CE, 2,200 Vac for 1 minute for UL, and 2,640 Vac for 1 minute for CSA
Positive opening		No
Short circuit protection		20 A Bussmann Class CC KTK-R-20 fuse, non-time-delay (recommended)
Terminal wire sizes (cabling/screw clamp)		12 – 22 AWG (3.31 mm ² – 0.326 mm ²) wire max.
Maximum actuation speed		15.2 mpm / 27.4 mpm (50 fpm / 90 fpm) with 45° cam angle, levers only

Maximum current ratings for control circuit contacts

Contacts	AC								DC			
	Volts	Inductive 35% power factor					Resistive 75% power factor		Volts	Inductive and resistive		Continuous carrying amperes
		Make		Break		Continuous carrying amperes	Make, break and continuous carrying amperes	Make and break amperes				
		Amperes	VA	Amperes	VA			Single throw		Double throw		
SPDT Quick Make and Break	120	150	18,000	20	2400	20	20	20	120	5.0	°	20
	240	75	18,000	12.5	3000	20	20	20	250	1.0	°	20
	480	37.5	18,000	6.25	3000	20	20	20	600	0.2	°	20
	600	30	18,000	5	3000	20	20	20				
All Slow Make and Break	120	60	7200	6	720	20	10	20	—	—	—	—
	240	30	7200	3	720	20	10	20	—	—	—	—
	480	15	7200	1.5	720	20	10	20	—	—	—	—
	600	12	7200	1.2	720	20	10	20	—	—	—	—

Specifications for material and ratings comparisons — standard switches

	9007 Type T/FT	Type L (R. B. Denison® Loxswitch™)
Body material	Cast zinc	Cast aluminum
Cover material	Cast zinc	Aluminum
Base plate material	Steel with zinc plating	Steel with chromate plating
Shaft seal material	Nitrile	PVC
Contact block material	Phenolic	Glass filled nylon
Moveable contact material	Fine silver on copper backing	Coin silver on steel backing
Stationary contact material	Fine silver on copper backing	90/10 AgCdO on copper backing
Low ambient temperature rating	-10° F	0° F
High ambient temperature at full rating	180° F	200° F (1)
Enclosure rating	NEMA Types 1, 2, 4, 12 and 13	NEMA Types 1, 4 and 13
Vibration resistance	10G (10–150 Hz)	40G max (10–150 Hz)

(1) Many switches are available with higher or lower temperature limits by selecting special versions or special options. See page 6/7.

Universal catalog numbers

Base plate, surface-mounted

Style	A	B	C	D	A 9007TUA1 B 9007TUB1 C 9007TUC1 D 9007TUD1	9007TUA2 9007TUB2 9007TUC2 9007TUD2	9007TUA3 9007TUB3 9007TUC3 9007TUD3	9007TUA4 9007TUB4 9007TUC4 9007TUD4	9007TUA5 9007TUB5 9007TUC5 9007TUD5	9007TUA6 9007TUB6 9007TUC6 9007TUD6
					No. 1	No. 2	No. 3 (4)	No. 4	No. 5	No. 6
					SPDT Spring return CW only	SPDT Spring return CW only	SPDT Maintained contact	SPDT Spring return neutral position	SPDT Spring return CCW only	SPDT Spring return CCW only
					Initial position and CCW 	Initial position and CCW 	Spring return of arm to initial pos. Contact pos. maintained until operated in reverse direction 	Initial position 	Initial position and CW 	Initial position and CW
					CW 	Middle CW Final CW 	CCW A B CW A B If high speed cam or snap-back is present, use No. 12 	CCW A B CW A B 	CCW 	Middle CCW Final CCW

Specifications

Nominal operating data

Pre-travel (1)	14°	Int. Pos. 9°, Final 16°	7°	6°	14°	Int. Pos. 9°, Final 16°
Total travel	88°	88°	81°	81°	88°	88°
Differential	12°	5°	7°	5°	12°	5°
Operating torque	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)
Repeat accuracy (2)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

Weight lb (kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)

Universal catalog numbers (continued)

Base plate, surface-mounted

Style	A	B	C	D	A 9007TUA7 B 9007TUB7 C 9007TUC7 D 9007TUD7	9007TUA8 9007TUB8 9007TUC8 9007TUD8	9007TUA9 9007TUB9 9007TUC9 9007TUD9	9007TUA10 9007TUB10 9007TUC10 9007TUD10	9007TUA11 9007TUB11 9007TUC11 9007TUD11	9007TUA12 9007TUB12 9007TUC12 9007TUD12
					No. 7	No. 8 (4)	No. 9	No. 10	No. 11	No. 12
					SPDT Maintained	SPDT Maintained neutral position	SPDT Spring return slow make, slow break	SPDT Spring return slow make, slow break	SPDT Spring return slow make, slow break	SPDT Maintained
					If high speed cam or snap-back present, use No. 12 	Initial position If high speed cam or snap-back is present, use No. 12 	Initial position and CCW 	Initial position 	Initial position and CW 	CCW A B CW A B

Specifications

Nominal operating data

Pre-travel (1)	10°	6°	12°	3°	12°	45°
Total travel	85°	81°	87°	81°	87°	90°
Differential	12°	10°	0°	0°	0°	0°
Operating torque	2.5 lb-in (0.28 N·m)	2.5 lb-in (0.28 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	8 lb-in (0.9 N·m)
Repeat accuracy (2)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

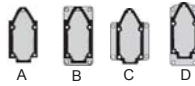
						Not adjustable
Weight lb (kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)

Footnotes: see page 6/?

Standard catalog numbers

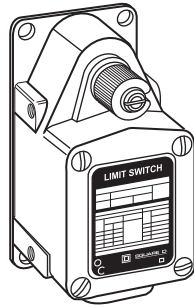
Base plate, surface-mounted

Style



A
B
C
D

9007TSA1	9007TSA2	9007TSA3
9007TSB1	9007TSB2	9007TSB3
9007TSC1	9007TSC2	9007TSC3
9007TSD1	9007TSD2	9007TSD3



No. 1	No. 2	No. 3
SPDT Spring return CW & CCW	SPDT Spring return CW & CCW	SPDT Spring return CW & CCW Slow make, Slow break
Initial position CW and CCW 	Initial position CW and CCW Middle Final 	Initial position CW and CCW

Specifications (nominal operating data)

Switch actuation	By 30° cam		
Type of actuation			
Pre-travel (1)	14°	Int. Pos. 9°, Final 16°	9°
Total travel	89°	89°	89°
Differential	12°	Int. Pos. 5.5°, Final 7.5°	5°
Reverse overtravel	N/A (future availability)	N/A (future availability)	N/A (future availability)
Operating torque/force 1 pole & 2 pole	10 lb-in (1.13 N·m)	10 lb-in (1.13 N·m)	10 lb-in (1.13 N·m)
Terminal wire sizes (cabling/screw clamp)	#12–22 AWG (3.31–0.326 mm²)	#12–22 AWG (3.31–0.326 mm²)	#12–22 AWG (3.31–0.326 mm²)
Repeatability (2) (linear travel of cam)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)
Cable entry (metric available)	1/2" NPT	1/2" NPT	1/2" NPT
Weight lb (kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)	2.35 lb. (1.07 kg)

(1) The pre-travel listed may vary up to 5° additional for universal switches or up to 2° additional for standard switches due to free travel of lever arm at initial position.

(2) Linear travel of cam on 1.5 in. (38.1 mm) lever arm.

(3) Remove spring from the positioning plate.

(4) Sequence 3, 7, and 8 devices are available but are not recommended where high speed cams or lever arm snap-back is present.
The application should be checked and No. 12 sequences substituted where possible.

Universal catalog numbers

Base plate, surface-mounted

A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
	No. 1	No. 2	No. 3 (4)	No. 4	No. 5	No. 6
	SPDT Spring return CW only	SPDT Spring return CW only	SPDT Maintained contact	SPDT Spring return neutral position	SPDT Spring return CCW only	SPDT Spring return CCW only
	Initial position and CCW	Initial position and CCW	Spring return of arm to initial pos. Contact pos. maintained until operated in reverse direction	Initial position	Initial position and CW	Initial position and CW

Specifications

Nominal operating data

Pre-travel (1)	14°	Int. Pos. 9°, Final 16°	7°	6°	14°	Int. Pos. 9°, Final 16°
Total travel	88°	88°	81°	81°	88°	88°
Differential	12°	5°	7°	5°	12°	5°
Operating torque	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)
Repeat accuracy (2)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

Weight lb (kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)

Universal catalog numbers (continued)

Base plate, surface-mounted

A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
	No. 7	No. 8 (4)	No. 9	No. 10	No. 11	No. 12
	SPDT Maintained	SPDT Maintained Neutral Position	SPDT Spring Return Slow Make, Slow Break	SPDT Spring Return Slow Make, Slow Break	SPDT Spring Return Slow Make, Slow Break	SPDT Maintained
	If high speed cam or snap-back present, use No. 12	Initial position If high speed cam or snap-back present, use No. 12	Initial position and CCW	Initial position	Initial position and CW	CCW

Specifications

Nominal operating data

Pre-travel (1)	10°	6°	12°	3°	12°	45°
Total travel	85°	81°	87°	81°	87°	90°
Differential	12°	10°	0°	0°	0°	0°
Operating torque	2.5 lb-in (0.28 N·m)	2.5 lb-in (0.28 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	12 lb-in (1.35 N·m)	8 lb-in (0.9 N·m)
Repeat accuracy (2)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)

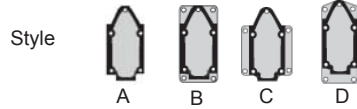
To convert sequences, remove base plate, position plate and latches. Reassemble positioning plate and latches as shown.

						Not adjustable
Weight lb (kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)	2.57 lb (1.17 kg)

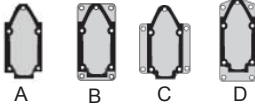
Footnotes: see page 6/6

Standard catalog numbers

Base plate, surface-mounted



Style

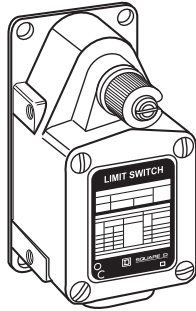


A
B
C
D

9007FTSA1
9007FTSB1
9007FTSC1
9007FTSD1

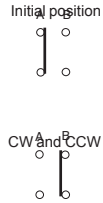
9007FTSA2
9007FTSB2
9007FTSC2
9007FTSD2

9007FTSA3
9007FTSB3
9007FTSC3
9007FTSD3



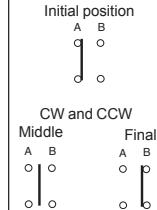
No. 1

Single Pole
Double Throw
Spring Return
CW & CCW



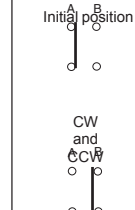
No. 2

Single Pole
Double Throw
Spring Return
CW & CCW



No. 3

Single Pole
Double Throw
Spring Return
CW & CCW
Slow Make
Slow Break



Characteristics (nominal operating data)

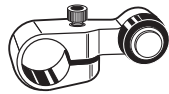
Switch actuation	By 30° cam		
Type of actuation			
Pre-travel (1)	14°	Int. Pos. 9°, Final 16°	9°
Total travel	89°	89°	89°
Differential	12°	Int. Pos. 5.5°, Final 7.5°	5°
Reverse overtravel	N/A (future availability)	N/A (future availability)	N/A (future availability)
Operating torque/force 1 pole & 2 pole	10 lb-in (1.13 N•m)	10 lb-in (1.13 N•m)	10 lb-in (1.13 N•m)
Terminal wire sizes (cabling/screw clamp)	#12–22 AWG (3.31–0.326 mm²)	#12–22 AWG (3.31–0.326 mm²)	#12–22 AWG (3.31–0.326 mm²)
Repeatability (2) (linear travel of cam)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)	± 0.004 in. (0.10 mm)
Cable entry (metric available)	1/2" NPT	1/2" NPT	1/2" NPT
Weight lb (kg)	2.57 lb. (1.17 kg)	2.57 lb. (1.17 kg)	2.57 lb. (1.17 kg)

(1) The pre-travel listed may vary up to 5° additional for universal switches or up to 2° additional for standard switches due to free travel of lever arm at initial position.

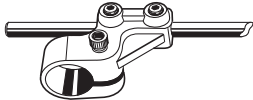
(2) Linear travel of cam on 1.5 in. (38.1mm) lever arm.

(3) Remove spring from the positioning plate.

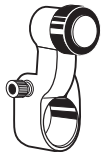
(4) Sequence 3, 7, and 8 devices are available but are not recommended where high speed cams or lever arm snap-back is present. The application should be checked and No. 12 sequences substituted where possible.



Standard roller



Rod type
(rod not included)



Standard roller

Offset type

6



120° Forked



90° forked

Standard roller

Arm	Steel roller			Catalog number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Optional	0.25 (6.3)	9007B1	0.17 (0.077)
1.5 (38.1)	1.0 (25.4)	Optional	0.25 (6.3)	9007B2	0.19 (0.086)
1.5 (38.1)	1.38 (35)	Optional	0.25 (6.3)	9007B3	0.23 (0.104)
2.5 (63.5)	0.75 (19)	Optional	0.25 (6.3)	9007B7	0.25 (0.113)
2.5 (63.5)	1.0 (25.4)	Optional	0.25 (6.3)	9007B8	0.25 (0.113)
2.5 (63.5)	1.38 (35)	Optional	0.25 (6.3)	9007B9	0.27 (0.122)
1.5 (38.1)	0.75 (19)	Optional	0.5 (12.7)	9007B12	0.34 (0.154)
1.5 (38.1)	1.0 (25.4)	Optional	0.5 (12.7)	9007B13	0.34 (0.154)
1.5 (38.1)	1.38 (35)	Optional	0.5 (12.7)	9007B14	0.42 (0.191)
5 (127)	0.75 (19)	Optional	0.25 (6.3)	9007B19	1.00 (0.454)
2.88 (73.1)	0.75 (19)	No roller	—	9007B21	0.20 (0.091)
2.5 (63.5)	0.75 (19)	Optional	0.5 (12.7)	9007B22	0.22 (0.100)
2.5 (63.5)	1.0 (25.4)	Optional	0.5 (12.7)	9007B23	0.28 (0.127)
2.5 (63.5)	1.38 (35)	Optional	0.5 (12.7)	9007B24	0.36 (0.163)
Adjustable ⁽¹⁾	0.75 (19)	Optional	0.25 (6.3)	9007R18	0.50 (0.227)
Adjustable ⁽¹⁾	1.0 (25.4)	Optional	0.25 (6.3)	9007R19	0.50 (0.227)
Adjustable ⁽¹⁾	1.38 (35)	Optional	0.25 (6.3)	9007R20	0.50 (0.227)

1. Does not include lever arm clamp or rod. If lever arm clamp is required, use 9007R17.

Adjustable rod, customer supplied

3/16" dia., round	9007R16
1/4" dia., or square	9007R17

Offset type (for obtaining different cam track dimensions)

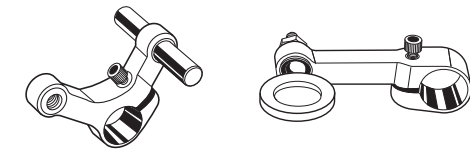
Arm	Steel roller			Catalog number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Inside offset	0.25 (6.3)	9007C1	0.50 (0.227)
1.5 (38.1)	1.0 (25.4)	Inside offset	0.25 (6.3)	9007C2	0.50 (0.227)
1.5 (38.1)	1.38 (35)	Inside offset	0.25 (6.3)	9007C3	0.50 (0.227)
1.5 (38.1)	0.75 (19)	Outside offset	0.25 (6.3)	9007D1	0.18 (0.082)
1.5 (38.1)	1.0 (25.4)	Outside offset	0.25 (6.3)	9007D2	0.18 (0.082)
1.5 (38.1)	1.38 (35)	Outside offset	0.25 (6.3)	9007D3	0.18 (0.082)
1.88 (48)	0.75 (19)	Outside offset	0.25 (6.3)	9007E4	0.20 (0.091)
1.88 (48)	1.0 (25.4)	Outside offset	0.25 (6.3)	9007E5	0.27 (0.122)
1.88 (48)	1.38 (35)	Outside offset	0.25 (6.3)	9007E6	0.27 (0.122)
1.88 (48)	0.75 (19)	Inside offset	0.25 (6.3)	9007F4	0.30 (0.136)
1.88 (48)	1.0 (25.4)	Inside offset	0.25 (6.3)	9007F5	0.30 (0.136)
1.88 (48)	1.38 (35)	Inside offset	0.25 (6.3)	9007F6	0.30 (0.136)

120° forked (for maintained contact lever arm type switches)

Arm	Steel roller			Catalog number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Same side	0.25 (6.3)	9007J1	0.31 (0.141)
1.5 (38.1)	1.0 (25.4)	Same side	0.25 (6.3)	9007J2	0.40 (0.181)
1.5 (38.1)	0.75 (19)	LH on opp. side	0.25 (6.3)	9007K1	0.50 (0.227)
1.5 (38.1)	1.0 (25.4)	LH on opp. side	0.25 (6.3)	9007K2	0.50 (0.227)
1.5 (38.1)	0.75 (19)	RH on opp. side	0.25 (6.3)	9007N1	0.66 (0.299)
1.5 (38.1)	1.0 (25.4)	RH on opp. side	0.25 (6.3)	9007N2	0.70 (0.316)

90° forked (for maintained contact lever arm type switches)

Arm	Steel roller			Catalog number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	Same side	0.25 (6.3)	9007X1	0.30 (0.136)
1.5 (38.1)	1.0 (25.4)	Same side	0.25 (6.3)	9007X2	0.40 (0.181)
1.5 (38.1)	0.75 (19)	RH on opp. side	0.25 (6.3)	9007Y1	0.50 (0.227)
1.5 (38.1)	1.0 (25.4)	RH on opp. side	0.25 (6.3)	9007Y2	0.50 (0.227)
1.5 (38.1)	0.75 (19)	LH on opp. side	0.25 (6.3)	9007Z1	0.66 (0.299)
1.5 (38.1)	1.0 (25.4)	LH on opp. side	0.25 (6.3)	9007Z2	0.70 (0.316)



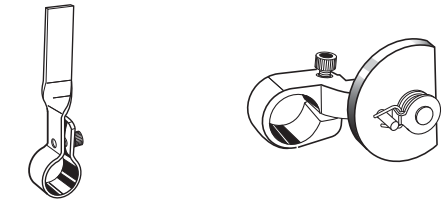
With reset

Cable operated



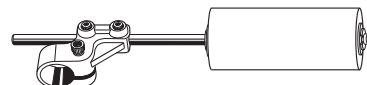
Rod type
(rod not included)

Ball bearing type

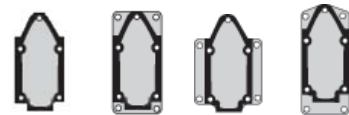


Weld-on type

1-Way roller type



Conveyor side guide
(use with 9007R16 or R17)



Style A Style B Style C Style D

Base plates

Lever Arms

Cable operated

Arm	Steel roller	Roller		Catalog number	Weight lb (kg)
Length in. (mm)	Diameter in. (mm)	Roller position	Width in. (mm)		
1.5 (38.1)	0.75 (19)	None	None	9007Y3	—
2.5 in. (63.5mm) long with eyebolt 0.25 (6.3mm) I.D. instead of roller.				9007B27	—

Rod type (used on conveyor systems or where unusual shapes are required)

Adjustable	3/16 in. round rod, not included	9007R16	0.18 (0.081)
Adjustable	1/4 in. key stock, not included	9007R17	0.18 (0.081)

Rod not included and key stock not included

Ball bearing type (for abrasive dust areas or with high speed cams)

1.5 (38.1)	0.75 (19)	Center	0.28 (7.1)	9007B16	0.15 (0.068)
------------	-----------	--------	------------	---------	--------------

Weld-on type (used where a special operator is required to weld to lever)

3.5 (89)	0.75 (19)	None	None	9007G10	0.50 (0.227)
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One way roller type (used with reversible cams for one way operations)

1.5 (38.1)	0.75 (19)	Outside offset	0.25 (6.3)	9007D4	0.64 (0.290)
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Conveyor side guide

8.44 in. (214.3) long with 1.5 in. (38.1) dia. 3.75 in. (95.2) acetal resin roller	9007R21	1.63 (0.739)
8.44 in. (214.3) long with 0.88 in. (22.3) dia. 3.75 in. (95.2) acetal resin roller	9007R22	1.42 (0.644)

Separate base plates (2)

Style	Mounting holes	Catalog number	Weight lb (kg)
A	None (1)	2934D32G1	—
B	End	2934D14G1	0.34 (0.154)
C	Side	2934D33G1	0.42 (0.191)
D	End	2934D34G1	0.36 (0.163)

(1) No mounting holes in base plate. Side mounting holes in switch case must be used.

(2) Acceptable wire sizes 14–18 AWG (2.08–0.823 mm²); recommended terminal clamp torque 13–16 lb-in. (1.46–1.80 N·m).

Optional conduit threads

Description	Catalog number	Weight lb (kg)
Metric		
M20 - 20mm (per B.S. 4568)	M11	—
Example: 9007TUB4M11		

Three point contacts — Ordering information

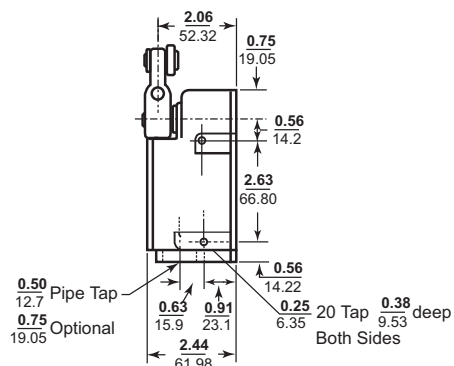
Select Type number of desired contact operating sequence for standard contact switch.

Change the letter following "T" or "FT" as shown below.

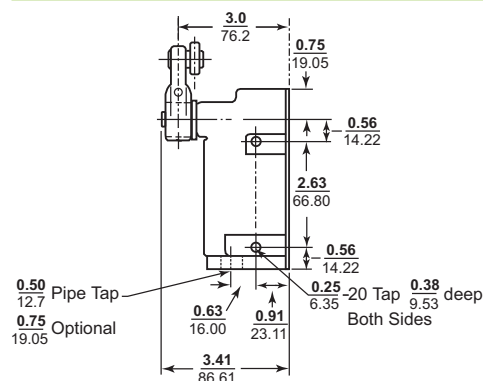
Change:	U to Y	Contact configuration changes
For example:	S to K	From:
TUB1 changes to TYB1		From:
TSB1 changes to TKB1		From:

Surface mounting

Type T

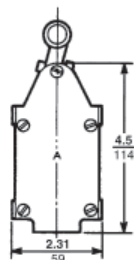


Type FT



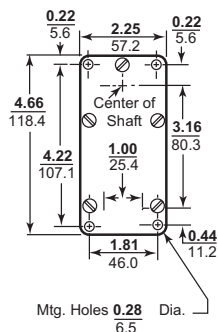
Base plates

Style A



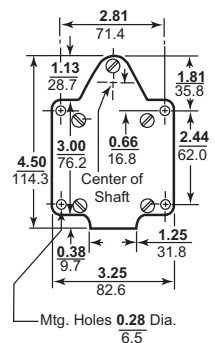
Note: For side mounting only

Style B



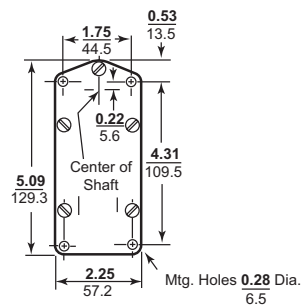
Mtg. Holes 0.28 Dia. 6.5

Style C



Mtg. Holes 0.28 Dia. 6.5

Style D

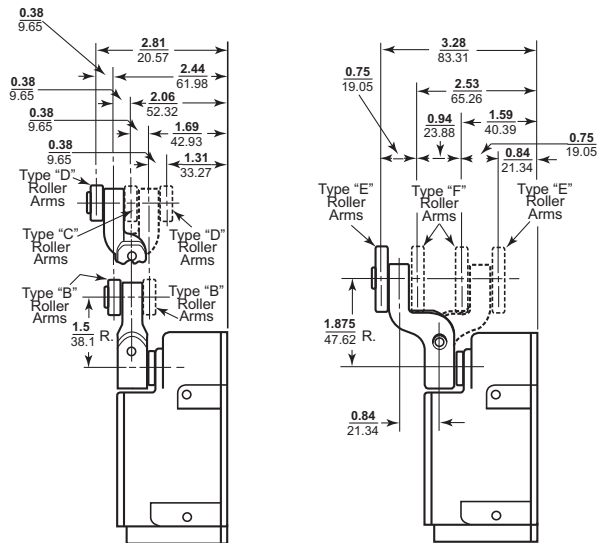


Mtg. Holes 0.28 Dia. 6.5

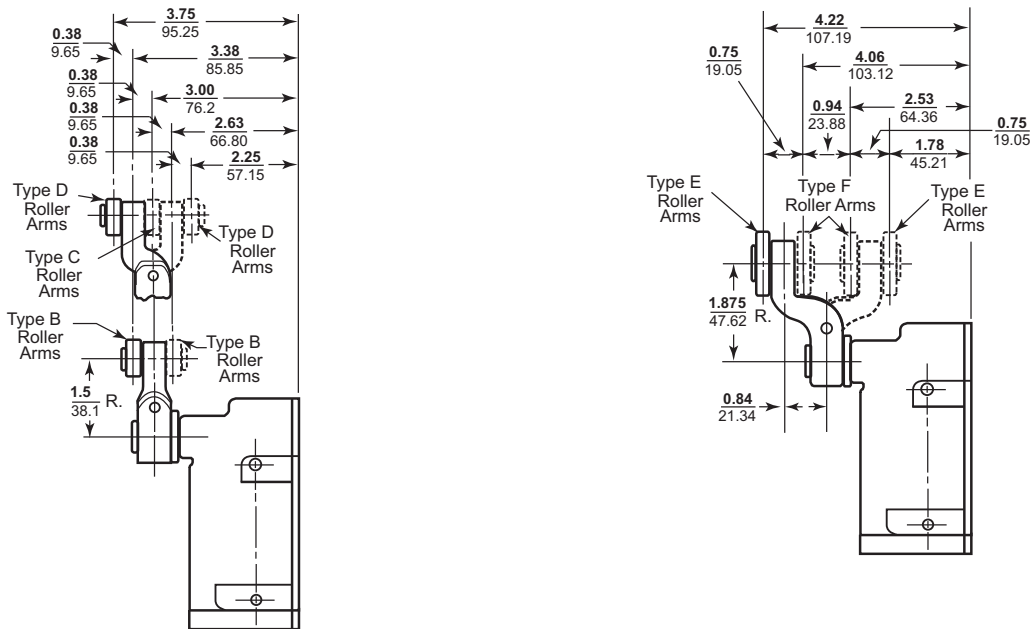
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

CAM track dimensions

Type T



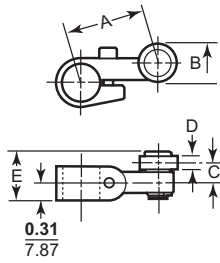
Type FT



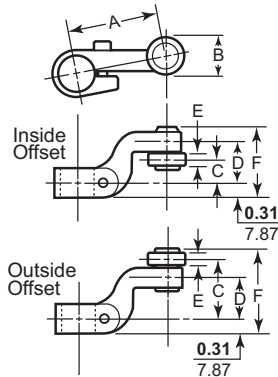
Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

Type T and FT lever arms

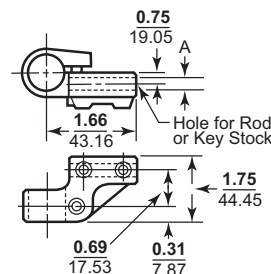
Standard roller



Offset type

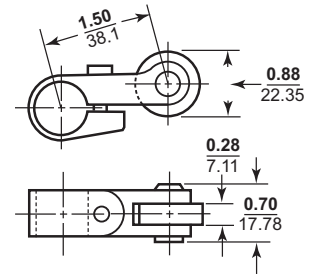


Adjustable length rod type

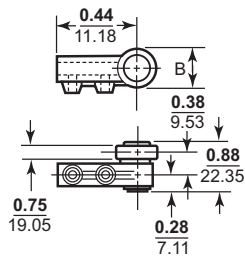


Type	Dimensions
R16	3/16" round
R17	1/4" square

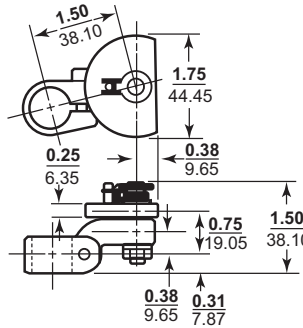
Ball bearing roller type B16



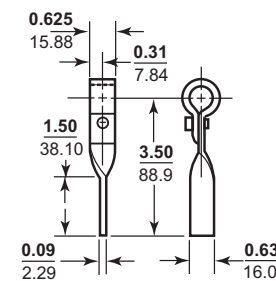
Roller arm for use with type R17



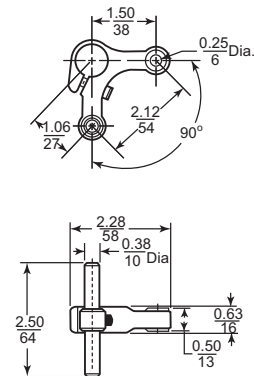
1-Way roller type D4



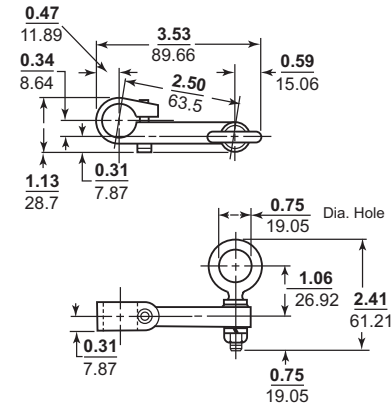
Weld-on arm type G10



Cable operated with reset type Y3



Cable operated type B27



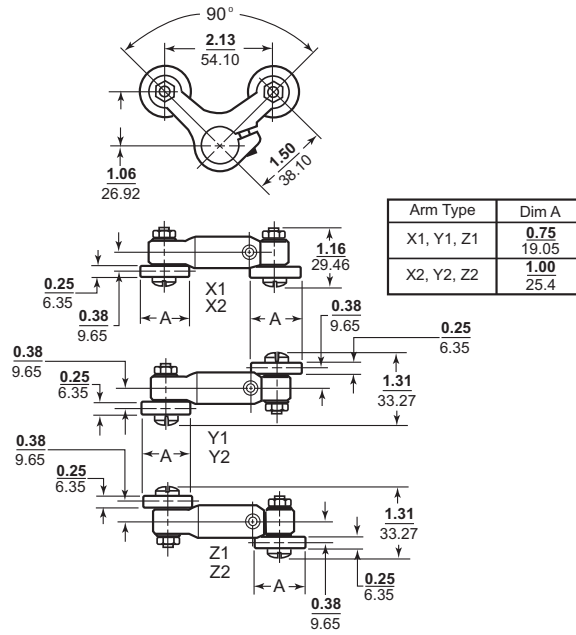
6

Dual dimensions: $\frac{\text{in.}}{\text{mm}}$

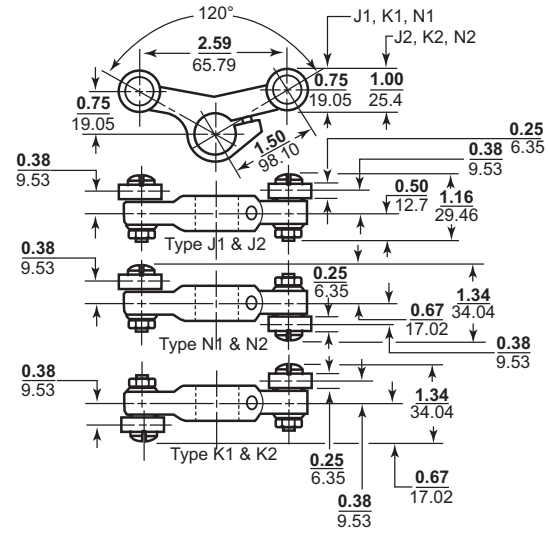
Note: All levers on this page can be used on Type C limit switches by installing the 9007S9 hub.

Type T and FT lever arms (continued)

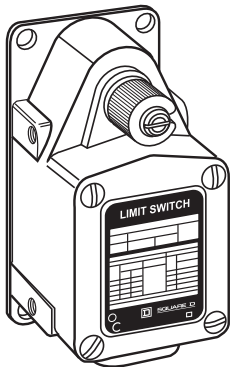
90° forked



120° forked

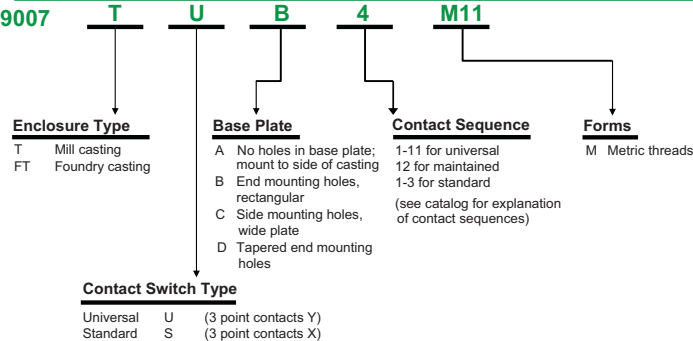


9007T and FT



9007T and FT Severe Duty Limit Switches

The table below is intended to describe how the catalog number is laid out. It is to be used with existing numbers only from the catalog. New catalog numbers should not be generated, built up, or developed from the table below. If the contact sequence is not listed, contact your local field office.



The interpretation of catalog numbers is intended to help you understand how the catalog number is laid out. It is to be used with existing numbers only. The table below should not be used to generate new catalog numbers. If the contact sequence required is not listed, contact your local field office.

L100 and L300

100/L300 Severe Duty Mill & Foundry Limit Switches

atalog Number Interpretation

Style	Housing			Function	Mounting Plate	Front Cover		Contact Arrangement		
L	1	0	0	W	S	2	P	F		
									1 to 60	
Mill	100		L14" and L2163 pull cord switches	WS	Style 1	1	M		Standard metal	
Foundry	300				Style 2	2	PF		Transparent plastic	
Belt Conveyor	525				Style 3	3	GF		Transparent plastic with neon light	
Two circuit single operation			WD				Style 4	4		
Two circuit dual operation										
Triple circuit										
Neutral										
				WN						

The only modifications to the existing catalog numbers are:

- Base plates: Select style 1, 2, 3 or 4
 - Front covers: Select metal, transparent plastic, or transparent plastic with neon light.
- For special features, see page 6/84.

Limit switches

R.B.Denison® Lox-Switch™ L severe duty mill and foundry switches conforming to NEMA A600 and UL508

Description

L100W Switches (1)

Use the L100W mill switches instead of other limit switches in the following applications:

- Where the current load exceeds the typical heavy duty limit switch contact rating of 10 A and falls within the range of up to 20 A continuous.
- Where an operating sequence is required that is not possible on other limit switches (35 choices with the L switches).
- Where higher reset forces are required due to foreign material interfering with lever arm operation, or where long heavy arms must reset against gravity.

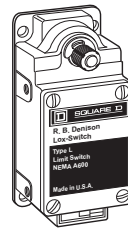
(1) L switches are not preceded by 9007. They are known as the R.B.Denison® Loxswitch™ L, and include conveyor belt and slack cable pull switches in the product offering.

L300W Switches

The L300W Foundry switches are for use in foundries or mills where the applications described above are required, and where falling foundry sand or similar material could build up and jam the operating mechanism. The shaft has a dust boot and extends from the switch case, preventing sand buildup around the shaft.

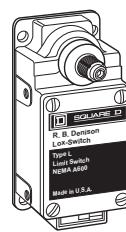
L100, L300 switches (fixed sequence)

L100 mill



Page 6/7

L300 foundry



Page 6/7

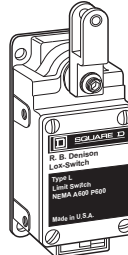
- Model L300 is an extra heavy duty version for very aggressive environments
 - The booted shaft design prevents penetration of foreign materials such as sand, dust, or grit between the shaft and the bushing.
 - Heavy duty stainless steel springs and hardened spring operators permit longer life under extreme lever fly-back and high impact.
 - Same parameters as L100 models, except that the distance between the back of the switch and the lever is increased by 0.34 in. (8.6 mm).

Features L100, L300, L140, L2153, L525

- Captive cover screws.
- Heavy duty snap action mechanism prevents teasing or false contact opening.
- Positive trip action prevents the lever from slipping around the 0.5 in. (12.7 mm) shaft even if not properly tightened.
- High current capability. 20 A maximum continuous.
- Isolated (no polarity) double and triple circuits with double break (throw) action.
- Wide 0.25 in. (6.3 mm) contact gap ensures very high shock and vibration resistance.
- Easy-to-access contacts allow for easy inspection and replacement.
- Stamped contact configuration number for easy identification even if the switch is painted.
- Many contact arrangements to solve difficult applications.
- Model L300 is an extra heavy duty version for very aggressive environments.
 - The booted shaft design prevents penetration of foreign materials such as sand, dust, or grit between the shaft and the bushing.
 - Heavy duty stainless steel springs and hardened spring operators permit longer life under extreme lever fly-back and high impact.
 - Same parameters as L100 models, except that the distance between the back of the switch and the lever is increased by 0.34 in. (8.6 mm).
- Two and three circuits in CW, CCW, neutral position, spring return and maintained, snap action or slow-make slow-break, two steps (L525) are available.
- Two circuit models can be CW or CCW field converted.
- Wide range of options: high shock and vibration, with gold contact, low or very high temperature.
- 0.5 in. (12.7 mm) NPT conduit entrance standard on 2-pole models (5 wires max.).
- 0.75 in. (19 mm) NPT conduit entrance standard on 3-pole models (7 wires max.).

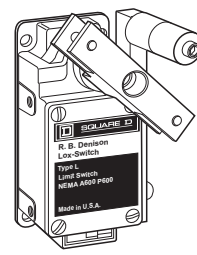
Cable pulls (fixed sequence)

L140 mill and foundry



Page 6/7

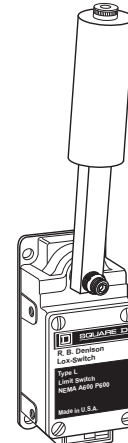
L2153 mill and foundry



Page 6/7

Belt conveyors

L525 mill and foundry



Page 6/7

Conveyor belt limit switches are ideal for policing the lateral movement of belt conveyors. When the conveyor belt shifts, it contacts the switch roller and a 12° movement of the lever transfers the first set of contacts. This set is usually wired to initiate a warning alarm system to alert the worker that the belt is moving off the rollers. Further lateral movement of the belt, causing the lever to move another 8°, trips the second set of contacts. These contacts are normally wired to the conveyor drive system, and when actuated, stop the system—minimizing damage to the conveyor, or loss of material on the belt.

Environmental specifications

Conforming to standards	UL508
Product certifications	UL Listed, CSA Certified, CE Marked
Protective treatment	Corrosion resistant gray paint
Ambient air temperature	-10 to +185 °F (-23 to +85 °C) With H prefix: -10 to +350 °F (-23 to +177 °C). (1)
Vibration resistance	10G (10–55 Hz)
Shock resistance	30G
Electric shock protection	Class 0
Degree of protection	NEMA Types 1, 2, 4, 12, 13, IP65, 66, 67
Cable entry or connector	1/2" NPT (metric available)
Materials	Aluminum (see Specifications table below)

(1) For a switch with an ambient temperature rating up to 350 °F (177 °C), add an H to the beginning of the catalog number.
For example, change catalog number L100WS2M2 to HL100WS2M2.

Contact block specifications

Rated operational specifications AC voltage hard contacts	NEMA A600 Ithe = 20 A 20 A resistive and continuous
Rated operational specifications DC voltage hard contacts	NEMA P600 Ithe = 20 A 20 A resistive and continuous
Rated insulation voltage	600 V
Rated impulse withstand voltage	2,500 Vac for 1 minute for CE, 2,200 Vac for 1 minute for UL, and 2,640 Vac for 1 minute for CSA
Positive opening	No
Short circuit protection	20 A Bussmann Class CC KTK-R-20 fuse, non-time-delay
Terminal wire sizes (cabling/screw clamp)	12 – 22 AWG (3.31 mm ² – 0.326 mm ²) wire max.
Maximum actuation speed	15.2 mpm / 27.4 mpm (50 fpm / 90 fpm) with 45° cam angle, levers only

Maximum current ratings for control circuit contacts

Contacts	AC								DC				
	Volts	Inductive 35% power factor					Resistive 75% power factor Make, break and continuous carrying Amperes		Volts	Inductive and resistive			
		Make		Break		Continuous carrying Amperes				Make and break Amperes		Continuous carrying Amperes	
		Amperes	VA	Amperes	VA	Single throw				Double throw			
SPDT Quick Make and Break	120 240 480 600	150 75 37.5 30	18,000 18,000 18,000 18,000	20 12.5 6.25 5	2400 3000 3000 3000	20 20 20 20	20 20 20 20	120 250 600	5.0 1.0 0.2	° ° °	20 20 20		
All Slow Make and Break	120 240 480 600	60 30 15 12	7200 7200 7200 7200	6 3 1.5 1.2	720 720 720 720	20 20 20 20	10 10 10 10	20 20 20 20	— — — —	— — — —	— — — —	— — — —	

Specifications for material and ratings comparisons — standard switches (2)

	9007 Type T/FT	Type L (R. B.Denison® Loxswitch™)
Body material	Cast zinc	Cast aluminum
Cover material	Cast zinc	Aluminum
Base plate material	Steel with zinc plating	Steel with chromate plating
Shaft seal material	Nitrile	PVC
Contact block material	Phenolic	Glass filled nylon
Moveable contact material	Fine silver on copper backing	Coin silver on steel backing
Stationary contact material	Fine silver on copper backing	90/10 AgCdO on copper backing
Low ambient temperature rating	-10° F	0° F
High ambient temperature at full rating (3)	180° F	200° F
Enclosure rating	NEMA Types 1, 2, 4, 12 and 13	NEMA Types 1, 4 and 13
Vibration resistance	10G (10–150 Hz)	40G max (10-150 Hz)

(2) The lever must not be allowed to snap freely from any overtravel position.

(3) Many switches are available with higher or lower temperature limits by selecting special versions or special options. See page 6/7.

L100 mill switches					
Description	Operating torque	Contact diagram	Catalog number	Operating data	Weight, lb (kg)
Snap-action CW spring return	190 oz-in (1.34 N•m)		L100WS2M1	A (see page 6/?)	1.51 (0.68)
Snap-action CCW spring return	190 oz-in (1.34 N•m)		L100WS2M2	A (see page 6/?)	1.51 (0.68)
Maintained contact (1) CW and CCW snap action	45 oz-in (0.32 N•m)		L100WS2M3	A (see page 6/?)	1.51 (0.68)
Snap action CW spring return	190 oz-in (1.34 N•m)		L100WDR2M4	A (see page 6/?)	1.51 (0.68)
Snap action CCW spring return	190 oz-in (1.34 N•m)		L100WDR2M5	A (see page 6/?)	1.51 (0.68)
Maintained contact (1) CW and CCW snap action	45 oz-in (0.32 N•m)		L100WDR2M6	A (see page 6/?)	1.51 (0.68)
Snap action CCW spring return	190 oz-in (1.34 N•m)		L100WDL2M7	A (see page 6/?)	1.51 (0.68)
Snap action CW spring return	190 oz-in (1.34 N•m)		L100WDL2M8	A (see page 6/?)	1.51 (0.68)
Snap action CW 1 N.O. / 2 N.O. spring return	190 oz-in (1.34 N•m)		L100WTR2M10	A (see page 6/?)	1.51 (0.68)
Snap action CCW 1 N.O. / 2 N.C. spring return	190 oz-in (1.34 N•m)		L100WTR2M11	A (see page 6/?)	1.51 (0.68)
Maintained contact (1) CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L100WTR2M12	A (see page 6/?)	1.51 (0.68)
Snap action CCW 2 N.O. / 1 N.C. spring return	190 oz-in (1.34 N•m)		L100WTL2M13	A (see page 6/?)	1.51 (0.68)
Snap action CW 1 N.O. / 2 N.C. spring return	190 oz-in (1.34 N•m)		L100WTL2M14	A (see page 6/?)	1.51 (0.68)
Maintained contact (1) CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L100WTL2M15	A (see page 6/?)	1.51 (0.68)
Neutral position (1) spring return slow make and break 1 N.O. contact per direction	95 oz-in (0.67 N•m)		L100WN2M16	B (see page 6/?)	1.51 (0.68)
Neutral position (1) spring return slow make and break 1 N.O. contact for both directions	95 oz-in (0.67 N•m)		L100WN2M17	B (see page 6/?)	1.51 (0.68)

L100 mill switches (continued)

Description	Operating torque	Contact diagram	Catalog number	Operating data	Weight, lb (kg)
Neutral position (1) spring return slow make and break 1 N.C.-CW, 1 N.C.-CCW	95 oz-in (0.67 N·m)		L100WNC2M18	B (see table below)	1.51 (0.68)
Neutral position (1) spring return slow make and break 2 N.O.-CW, 1 N.O.-CCW	95 oz-in (0.67 N·m)		L100WTRN2M20	B (see table below)	1.51 (0.68)
Neutral position (1) spring return slow make and break N.O.-CW, 2 N.O.-CCW	95 oz-in (0.67 N·m)		L100WTLN2M21	B (see table below)	1.51 (0.68)
Slow make-before-break CW spring return	170 oz-in (1.2 N·m)		L100WS02M22	C (see table below)	1.51 (0.68)
Slow make-before-break CCW spring return	170 oz-in (1.2 N·m)		L100WS02M23	C (see table below)	1.51 (0.68)
Neutral position (1) N.O.-CW, N.O.-CCW spring return snap action	170 oz-in (1.2 N·m)		L100WNS2M26	D (see table below)	1.51 (0.68)
Neutral position (1) N.O.-CW, N.O.-CCW maintained in CCW only	170 oz-in (1.2 N·m)		L100WNSR2M28	D (see table below)	1.51 (0.68)
Neutral position (1) N.O.-CW, N.O.-CCW maintained in CW only	170 oz-in (1.2 N·m)		L100WNSL2M29	D (see table below)	1.51 (0.68)
Neutral position (1) N.C.-CW, N.C.-CCW spring return snap action	170 oz-in (1.2 N·m)		L100WNCS2M34	D (see table below)	1.51 (0.68)
Neutral position (1) N.O.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N·m)		L100WTRN1C2M38	B (see table below)	1.51 (0.68)
Neutral position (1) N.O./N.C.-CW, N.O.-CCW spring return slow make and break	95 oz-in (0.67 N·m)		L100WTLN1C2M39	B (see table below)	1.51 (0.68)
Neutral position (1) N.O./N.C.-CW, N.C.-CCW spring return slow make and break	95 oz-in (0.67 N·m)		L100WTRN2C2M40	B (see table below)	1.51 (0.68)
Neutral position (1) N.C.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N·m)		L100WTLN2M41	B (see table below)	1.51 (0.68)
Neutral position (1) N.O./N.C.-CW, N.C.-CCW spring return snap action	95 oz-in (0.67 N·m)		L100WTRN2CS2M48	D (see table below)	1.51 (0.68)

Operating data for contact arrangements

	A	B	C	D
Pretravel	17° nominal	7° maximum	7° nominal	9° nominal
Differential travel	11° nominal	4° maximum	—	6° nominal
Overlapping travel	—	—	4° nominal	—
Total travel	80°	70°	80°	70°
Recommended installation travel	20°–35°	10°–25°	20°–35°	13°–30°
Repetitive accuracy of switch	± 0.03°	—	—	± 0.03°
Operating torque, max with return spring	190 oz-in (1.34 N·m)	95 oz-in (0.67 N·m)	170 oz-in (1.2 N·m)	170 oz-in (1.2 N·m)
Maintained contact	45 oz-in (0.317 N·m)	—	—	45 oz-in (0.317 N·m)

(1) Two-step snap action. One normally closed, one normally open; CW operation to first step to 2-C. Further CW operation to second step, 1-O, 1-C. Spring return. Pretravel 9° nominal. Additional travel 8° nominal. Differential second step 7° nominal. Differential first step 7° nominal.

L300 foundry switches					
Description	Operating torque	Contact diagram	Catalog number	Operating data	Weight, lb (kg)
Snap-action CW spring return	190 oz-in (1.34 N•m)		L300WS2M1	A (see page 6/?)	1.54 (0.70)
Snap-action CCW spring return	190 oz-in (1.34 N•m)		L300WS2M2	A (see page 6/?)	1.54 (0.70)
Maintained contact (1) CW and CCW snap action	45 oz-in (0.32 N•m)		L300WS2M3	A (see page 6/?)	1.54 (0.70)
Snap action CW spring return	190 oz-in (1.34 N•m)		L300WDR2M4	A (see page 6/?)	1.54 (0.70)
Snap action CCW spring action	190 oz-in (1.34 N•m)		L300WDR2M5	A (see page 6/?)	1.54 (0.70)
Maintained contact (1) CW and CCW snap action	45 oz-in (0.32 N•m)		L300WDR2M6	A (see page 6/?)	1.54 (0.70)
Snap action CCW spring return	190 oz-in (1.34 N•m)		L300WDL2M7	A (see page 6/?)	1.54 (0.70)
Snap action CW spring return	190 oz-in (1.34 N•m)		L300WDL2M8	A (see page 6/?)	1.54 (0.70)
Snap action CW 1 N.C./2 N.O. spring return	190 oz-in (1.34 N•m)		L300WTR2M10	A (see page 6/?)	1.54 (0.70)
Snap action CCW 1 N.O./2 N.C. spring return	190 oz-in (1.34 N•m)		L300WTR2M11	A (see page 6/?)	1.54 (0.70)
Maintained contact (1) CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L300WTR2M12	A (see page 6/?)	1.54 (0.70)
Snap action CCW 2 N.O./1 N.C. spring return	190 oz-in (1.34 N•m)		L300WTL2M13	A (see page 6/?)	1.54 (0.70)
Snap action CW 1 N.O./2 N.C. spring return	190 oz-in (1.34 N•m)		L300WTL2M14	A (see page 6/?)	1.54 (0.70)
Maintained contact (1) CW and CCW snap action 3 poles	45 oz-in (0.32 N•m)		L300WTL2M15	A (see page 6/?)	1.54 (0.70)
Neutral position (1) spring return slow make and break 1 N.O. contact per direction	95 oz-in (0.67 N•m)		L300WN2M16	B (see page 6/?)	1.54 (0.70)
Neutral position (1) spring return slow make and break 1 N.O. contact for both directions	95 oz-in (0.67 N•m)		L300WN2M17	B (see page 6/?)	1.54 (0.70)

(1) Two-step snap action. One normally closed, one normally open; CW operation to first step to 2-C. Further CW operation to second step, 1-O, 1-C. Spring return. Pretravel 9° nominal. Additional travel 8° nominal. Differential second step 7° nominal. Differential first step 7° nominal.

L300 foundry switches (continued)

Description	Operating torque	Contact diagram	Catalog number	Operating data	Weight, lb (kg)
Neutral position (1) spring return slow make and break 1 N.O.-CW, 1 N.C.-CCW	95 oz-in (0.67 N·m)		L300WNC2M18	B (see table below)	1.54 (0.70)
Neutral position (1) spring return slow make and break 2 N.O.-CW, 1 N.O.-CCW	95 oz-in (0.67 N·m)		L300WTRN2M20	B (see table below)	1.54 (0.70)
Neutral position (1) spring return slow make and break N.O.-CW, 2 N.O.-CCW	95 oz-in (0.67 N·m)		L300WTLN2M21	B (see table below)	1.54 (0.70)
Slow make-before-break CW spring return	170 oz-in (1.2 N·m)		L300WS02M22	C (see table below)	1.54 (0.70)
Slow make-before-break CCW spring return	170 oz-in (1.2 N·m)		L300WS02M23	C (see table below)	1.54 (0.70)
Neutral position (1) N.O.-CW, N.O.-CCW spring return snap action	170 oz-in (1.2 N·m)		L300WNS2M26	D (see table below)	1.54 (0.70)
Neutral position (1) N.O.-CW, N.O.-CCW maintained in CCW only	170 oz-in (1.2 N·m)		L300WNSR2M28	D (see table below)	1.54 (0.70)
Neutral position (1) N.O.-CW, N.O.-CCW maintained in CW only	170 oz-in (1.2 N·m)		L300WNSL2M29	D (see table below)	1.54 (0.70)
Neutral position (1) N.C.-CW, N.C.-CCW spring return snap action	170 oz-in (1.2 N·m)		L300WNCS2M34	D (see table below)	1.54 (0.70)
Neutral position (1) N.O.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N·m)		L300WTRN1C2M38	B (see table below)	1.54 (0.70)
Neutral position (1) N.O./N.C.-CW, N.O.-CCW Spring return slow make and break	95 oz-in (0.67 N·m)		L300WTLN1C2M39	B (see table below)	1.54 (0.70)
Neutral position (1) N.O./N.C.-CW, N.C.-CCW spring return slow make and break	95 oz-in (0.67 N·m)		L300WTRN2C2M40	B (see table below)	1.54 (0.70)
Neutral position (1) N.C.-CW, N.O./N.C.-CCW spring return slow make and break	95 oz-in (0.67 N·m)		L300WTLN2M41	B (see table below)	1.54 (0.70)
Neutral position (1) N.O./N.C.-CW, N.C.-CCW spring return snap action	95 oz-in (0.67 N·m)		L300WTRN2CS2M48	D (see table below)	1.54 (0.70)

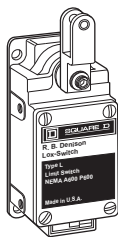
Operating data for contact arrangements

	A	B	C	D
Pretravel	17° nominal	7° maximum	7° nominal	9° nominal
Differential travel	11° nominal	4° maximum	—	6° nominal
Overlapping travel	—	—	4° nominal	—
Total travel	80°	70°	80°	70°
Recommended installation travel	20°–35°	10°–25°	20°–35°	13°–30°
Repetitive accuracy of switch	± 0.03°	—	—	± 0.03°
Operating torque, max with return spring	190 oz-in (1.34 N·m)	95 oz-in (0.67 N·m)	170 oz-in (1.2 N·m)	170 oz-in (1.2 N·m)
Maintained contact	45 oz-in (0.317 N·m)	—	—	45 oz-in (0.317 N·m)

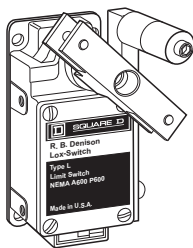
(1) Two-step snap action. One normally closed, one normally open; CW operation to first step to 2-C. Further CW operation to second step, 1-O, 1-C. Spring return. Pretravel 9° nominal. Additional travel 8° nominal. Differential second step 7° nominal. Differential first step 7° nominal.

L140 and L2153
cable pulls

Limit switches
R.B.Denison® Lox-Switch™ L severe duty mill and foundry
switches



L140 cable pull (order lever separately)



L2153 dual pull stop (lever included)

L140 series cable pulls ⁽¹⁾			
Circuit	Direction	Catalog number ⁽²⁾	Weight lb (kg)
1 N.C.	CW right	L142	1.54 (0.70)
1 N.O. and 1 N.C.	CW right	L143	1.54 (0.70)
1 N.O. and 1 N.C.	CCW left	L144	1.54 (0.70)
1 N.C.	CCW left	L145	1.54 (0.70)
2 N.O. and 1 N.C.	CW right	L146	1.54 (0.70)
2 N.C. and 1 N.O.	CW right	L147	1.54 (0.70)
2 N.O. and 1 N.C.	CCW left	L148	1.54 (0.70)
2 N.C. and 1 N.O.	CCW left	L149	1.54 (0.70)

(1) Style K levers were designed specifically for this application; see page 6/23 (order separately).

(2) To complete the catalog number, refer to page 6/? and add the suffix for the mounting plate style and the front cover material.

L2153 dual pull stop		
Description	Catalog number	Weight lb (kg)
Dual pull cord switch—maintained contacts (stop and lever included)	L2153	2.04 (0.93)

Characteristics	
Pretravel	17° ± 2°
Differential travel	11° ± 2°
Overlapping travel	—
Total travel	80°
Recommended installation travel	—
Repetitive accuracy of switch	± 0.03×
Operating torque, max with return spring	13–27 lb-in (1.47–3.05 N•m)
Reset torque	7–19 lb-in (0.79–2.14 N•m)
Temperature range	-20 to 120° F (-6.6 to 48.8° C)
Maintained contact	—

L525 belt conveyor switches

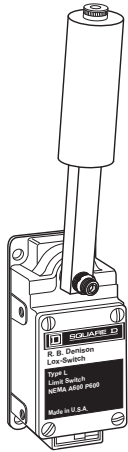
Description	Operating torque	Contact diagram	Catalog number	Weight lb (kg)
2 step sequence CW spring return, snap action, 2 N.O.	150 oz-in (1.06 N•m)		L525WDR2M56	1.5 (0.68)
2 step sequence CCW spring return, snap action, 2 N.O.	150 oz-in (1.06 N•m)		L525WDL2M57	1.5 (0.68)
2 step sequence CW spring return, snap action, 2 N.C.	150 oz-in (1.06 N•m)		L525WDL2M58	1.5 (0.68)
2 Step sequence CCW spring return, snap action, 2 N.C.	150 oz-in (1.06 N•m)		L525WDR2M59	1.5 (0.68)
2 Step sequence CW spring return, snap action, N.O./N.C (1)	150 oz-in (1.06 N•m)		L100WS0S2M60	1.5 (0.68)

(1) Two-step snap action. One normally closed, one normally open; CW operation to first step to 2-C. Further CW operation to second step, 1-O, 1-C. Spring return. Pretravel 9° nominal. Additional travel 8° nominal. Differential second step 7° nominal. Differential first step 7° nominal.

Specifications

Pretravel	12° nominal
Additional travel	8° nominal
Differential travel	7× nominal
Total travel	75° nominal
Operating torque, max with return spring	150 oz-in nominal (1.06 N•m)

6

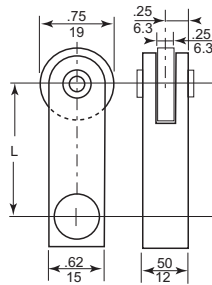


L525 belt conveyor switch

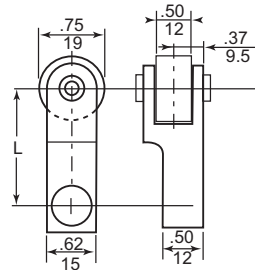
Lever arms

Lever arms are constructed of machined aluminum.

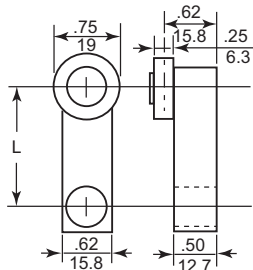
Dual dimensions: in. (m)



Style A



Style B



Style C

Style A steel roller

Arm	Steel roller		Catalog number	Weight
Length	Diameter	Width	(1)	lb (kg)
1.25 (31.7)	0.75 (19)	0.25 (6.3)	AC	0.06 (0.027)
1.50 (38.1)	0.75 (19)	0.25 (6.3)	AA	0.06 (0.027)
1.75 (44.4)	0.75 (19)	0.25 (6.3)	AD	0.07 (0.031)
2.00 (50.8)	0.75 (19)	0.25 (6.3)	AH	0.08 (0.036)
2.25 (57.1)	0.75 (19)	0.25 (6.3)	AJ	0.09 (0.041)
2.50 (63.5)	0.75 (19)	0.25 (6.3)	AO	0.10 (0.045)
2.75 (69.8)	0.75 (19)	0.25 (6.3)	AK	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.25 (6.3)	AB	0.11 (0.050)
3.50 (88.9)	0.75 (19)	0.25 (6.3)	AL	0.12 (0.054)
4.00 (101.6)	0.75 (19)	0.25 (6.3)	AM	0.13 (0.059)
4.50 (114.3)	0.75 (19)	0.25 (6.3)	AN	0.14 (0.064)
5.00 (127.0)	0.75 (19)	0.25 (6.3)	AP	0.16 (0.073)
5.50 (139.7)	0.75 (19)	0.25 (6.3)	AQ	0.18 (0.082)
6.00 (152.4)	0.75 (19)	0.25 (6.3)	AR	0.20 (0.091)

(1) Example: AC — This is the complete catalog number to order.

Style A options

Diameter	Description	Catalog number—add suffix
1.00 (25.4)	Roller	1
1.25 (32)	Roller	4
1.50 (38.1)	Roller	2
—	Nylon roller	N
0.75 (19)	Ball bearing roller	R
—	Stainless steel roller	NS

Style B steel roller

Arm	Steel roller		Catalog number	Weight
Length	Diameter	Width		lb (kg)
1.50 (38.1)	0.75 (19)	0.50 (12.7)	BA	0.06 (0.027)
2.00 (50.8)	0.75 (19)	0.50 (12.7)	BH	0.08 (0.036)
2.50 (63.5)	0.75 (19)	0.50 (12.7)	BO	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.50 (12.7)	BB	0.12 (0.054)
4.00 (101.6)	0.75 (19)	0.50 (12.7)	BM	0.13 (0.059)
4.50 (114.3)	0.75 (19)	0.50 (12.7)	BN	0.14 (0.064)
5.50 (139.7)	0.75 (19)	0.50 (12.7)	BQ	0.18 (0.082)
6.00 (152.4)	0.75 (19)	0.50 (12.7)	BR	0.20 (0.091)

Style B options

Diameter	Description	Catalog number—add suffix
—	Nylon roller	N
1.50 (38.1)	Roller	2

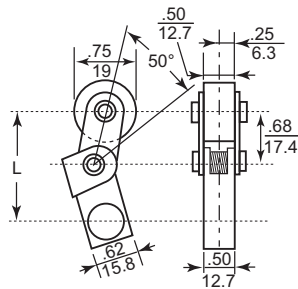
Style C steel roller on side

Arm	Steel roller		Catalog number	Weight
Length	Diameter	Width		lb (kg)
1.25 (31.7)	0.75 (19)	0.25 (6.3)	CC	0.06 (0.027)
1.50 (38.1)	0.75 (19)	0.25 (6.3)	CA	0.06 (0.027)
1.75 (44.4)	0.75 (19)	0.25 (6.3)	CD	0.07 (0.031)
2.00 (50.8)	0.75 (19)	0.25 (6.3)	CH	0.08 (0.036)
2.50 (63.5)	0.75 (19)	0.25 (6.3)	CO	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.25 (6.3)	CB	0.11 (0.050)
3.50 (88.9)	0.75 (19)	0.25 (6.3)	CL	0.12 (0.054)
4.00 (101.6)	0.75 (19)	0.25 (6.3)	CM	0.13 (0.059)
6.00 (152.4)	0.75 (19)	0.25 (6.3)	CR	0.20 (0.091)

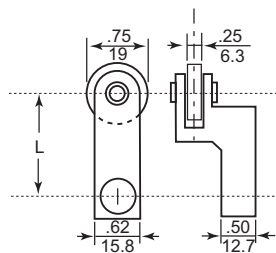
Style C options

Diameter	Description	Catalog number—add suffix
1.0 (24.5)	Roller	1
1.25 (32)	Roller	4
1.50 (38.1)	Roller	2
—	Nylon roller	N

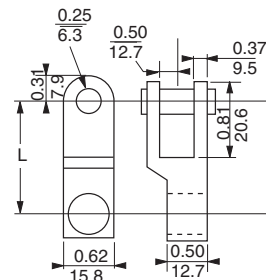
Dual dimensions: in. (mm)



Style E



Style F



Style K

Style E one way steel roller

Arm	Steel roller		Catalog number	Weight lb (kg)
Length	Diameter	Width		
1.50 (38.1)	0.75 (19)	0.50 (12.7)	EA	0.30 (0.136)
1.75 (44.4)	0.75 (19)	0.50 (12.7)	ED	0.40 (0.181)
3.00 (76.2)	0.75 (19)	0.50 (12.7)	EB	0.50 (0.227)

Style E options

Diameter in. (mm)	Description	Catalog number Add suffix
—	Nylon roller	N

Style F offset steel roller

Arm	Steel roller	Roller position		Catalog number	Weight lb (kg)
Length	Diameter	Offset	Width		
1.50 (38.1)	0.75 (19)	0.62 (15.8)	0.15 (3.8)	FB	0.06 (0.027)
1.50 (38.1)	0.75 (19)	0.87 (22.2)	0.15 (3.8)	FA	0.06 (0.027)
1.50 (38.1)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FC	0.06 (0.027)
2.00 (50.8)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FE	0.08 (0.036)
2.50 (63.5)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FG	0.10 (0.045)
3.00 (76.2)	0.75 (19)	0.62 (15.8)	0.15 (3.8)	FI	0.11 (0.050)
3.00 (76.2)	0.75 (19)	1.00 (25.4)	0.15 (3.8)	FJ	0.11 (0.050)

Style F options

Diameter	Description	Catalog number—Add Suffix
1.00 (24.5)	Roller	1
—	Nylon roller	N

Style K (for use with L140 cable pulls)

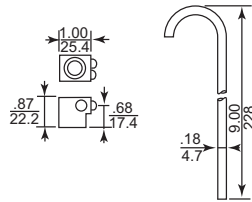
Arm	Steel roller	Description	Catalog number (1)	Weight lb (kg)
Length	Diameter			
1.50 (38.1)	—	—	KA	0.05 (0.023)
2.50 (63.5)	—	—	KO	0.08 (0.036)
3.00 (76.2)	—	—	KB	0.09 (0.041)

(1) Example: KA — This is the complete catalog number to order.

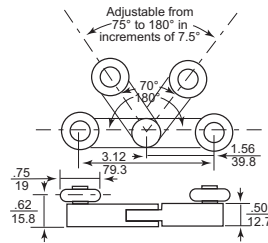
Style L (renewal parts for L2153 dual pull stop)

Description	Catalog number	Weight lb (kg)
Lever	AL1746	0.25 (0.113)
Mechanical stop	AL1649	0.10 (0.045)

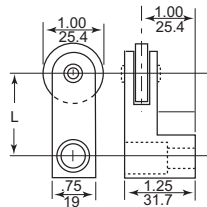
Dual dimensions: in. (mm)



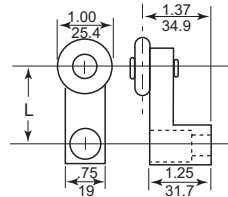
Style R



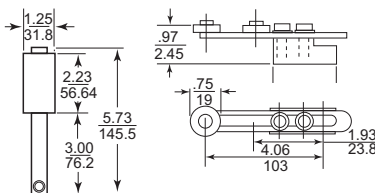
Style V



Style LA



Style LC



Rolling pin

Adjustable rolling pin

Style R steel rod

Description	Catalog number	Weight lb (kg)
Hub only	R	0.10 (0.045)
Rod only	R9	0.09 (0.041)

Style V yoke (for maintained position switches)

Description	Catalog number	Weight lb (kg)
Yoke	VA	0.50 (0.227)

Style V options

Diameter	Description	Catalog number—Add suffix
1.0 (24.5)	Roller	1
—	Nylon roller	N
0.75 (19)	Ball bearing roller	R

Style LA (to pass over switch cover)

Arm	Catalog number	Weight lb (kg)
Length		
1.50 (30)	LAA1	0.12 (0.054)
2.00 (50)	LAH1	0.12 (0.054)
2.50 (63)	LA01	0.12 (0.054)

Style LA options

Diameter	Description	Catalog number—Add suffix
1.5 (38)	Roller	2
—	Nylon roller	N

Style LC (to pass over switch cover)

Arm	Catalog number	Weight lb (kg)
Length		
1.50 (30)	LCA1	0.12 (0.054)
2.00 (50)	LCH1	0.12 (0.054)
2.50 (63)	LCO1	0.13 (0.059)

Style LC options

Diameter	Description	Catalog number—Add suffix
1.25 (32)	Roller	4
1.5 (38)	Roller	2
—	Nylon roller	N

Rolling pin (for use with 2 step switches for conveyor or belt applications)

Arm	Catalog number	Weight lb (kg)
Length		
2.25 (75.1)	AL1650	0.30 (0.136)
2.25 (75.1)	High temp. Teflon® material AL16501	0.33 (0.150)
3.0 (50.8)	AL1802	0.33 (0.150)

Rolling pin (adjustable)

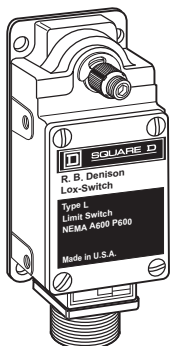
Arm	Steel roller		Catalog number	Weight
Length	Diameter	Width		lb (kg)
2.00 (51) to 4.00 (102)	0.75 (19)	0.25 (6.3)	AL1650	0.30 (0.136)

(1) Example: KA — This is the complete catalog number to order.

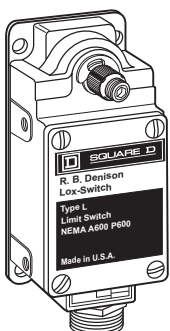
Note: No hub component is needed for Type AL rolling pins. The arm mounts directly onto the shaft of the switch.

Limit switches

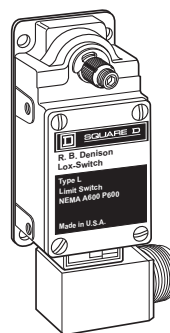
R.B.Denison® Lox-Switch™ L severe duty mill and foundry switches



Straight 4-pin male connector



Straight 5-pin male connector



90° angle 4-pin male connector

6

Housing options ⁽¹⁾

Description	Example Full catalog number	Catalog number Add prefix	Weight lb (kg)
0.75 in. conduit opening Available on 2 circuit switches. Standard on 3 circuit switches	L100WS2M1 changes to GL100WS2M1	G	1.54 (0.70)
High temperature 0 to +350 °F (-17.7 to +176.6 °C) (2) Metal front cover only	L100WS2M1 changes to HL100WS2M1	H	1.54 (0.70)
Low temperature -20 to 200 °F (-28.8 to +93.3 °C) (2)	L100WS2M1 changes to TL100WS2M1	T	1.54 (0.70)
High shock Available only on operating sequences 1, 2, 4, 5, 7-11, 13, 14	L100WS2M1 changes to L526WS2M1 L300WS2M1 changes to L326WS2M1	526 326	1.54 (0.70)
Gold infiltrated contacts	L100WS2M1 changes to L522WS2M1 L300WS2M1 changes to L322WS2M1	522 322	1.54 (0.70)
Metric conduit threads M20 (20 mm)	L100WS2M1 changes to ML100WS2M1	M	1.54 (0.70)

Wiring

Description	Example Full catalog number	Catalog number Add prefix	Weight lb (kg)
Straight male receptacle 4-pin (3) Factory prewired	L100WS2M1 changes to PL100WS2M1	P	1.54 (0.70)
90° Angle male receptacle 4-pin (3) Factory prewired—facing right	L100WS2M1 changes to APL100WS2M1	AP	1.54 (0.70)
Ministyle male receptacle 8 A max. 5-pin (double circuit) or 7 A max. 7-pin (triple circuit) Ministyle male connectors are: • 5-pin: Brad Harrison #41310 (or equal) • 7-pin: Brad Harrison #42805 (or equal)	L100WS2M1 changes to BL100WS2M1	B	1.54 (0.70)

Potted and prewired	Example Full catalog number	Add suffix	Weight lb (kg)
5 wires 6 ft (1.8 mm) long	L100WS2M1 changes to L100WS2M1P	P	1.54 (0.70)
5 wires 12 ft (3.6 mm) long	L100WS2M1 changes to L100WS2M1P12	P12	
5 wires 18 ft (5.5 mm) long	L100WS2M1 changes to L100WS2M1P18	P18	

Front covers

Description	Example Full catalog number	Catalog number Add suffix	Weight lb (kg)
Standard metal		M	—
Transparent plastic cover with metal frame		PF	—
Transparent plastic cover with metal frame and Neon indicator light (not connected)		GF	—
	L100WS2M1 changes to L100WS2PF 1		1.54 (0.70)

Accessories

Description		Catalog number	Weight lb (kg)
Sealed female plug and cable for P and AP connector			
4 pin, #16 AWG STO cable 140 °F (60 °C)	4 ft. (1.21 m)	1010004	1.20 (0.54)
	6 ft. (1.82 m)	1010006	1.25 (0.57)
	10 ft. (3.04 m)	10100010	1.50 (0.68)
Sealed female plug and cable for ministyle connector (B)			
5 pin, #16 AWG STO cable 221 °F (105 °C)	3 ft. (0.91 m)	BH2053	1.50 (0.68)
	6 ft. (1.82 m)	BH2056	1.70 (0.77)
	12 ft. (3.65 m)	BH20512	2.10 (0.95)

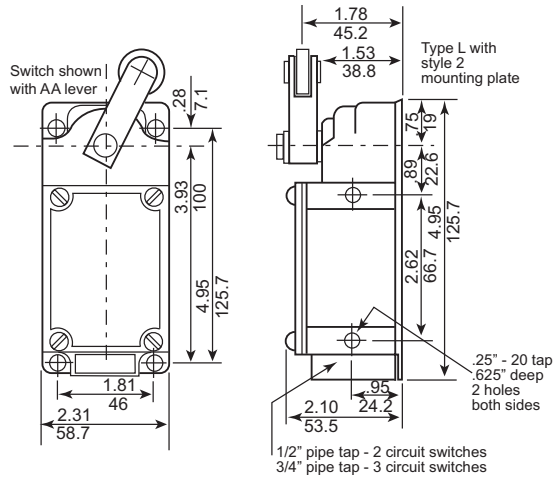
(1) Other options available — contact your local field office for details.

(2) The minimum temperatures listed are based on the absence of freezing moisture or water.

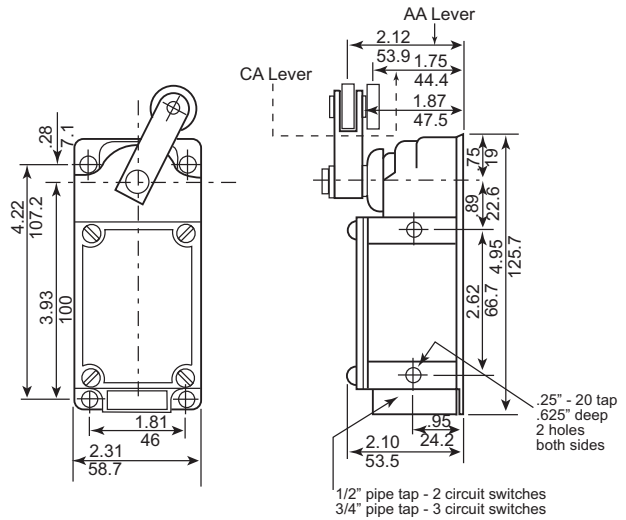
(3) Receptacle is a 4-pin male APL/PL-SWTS, Cannon part # MS3102E20-4P-F79 or equal.

Switches

Type L100

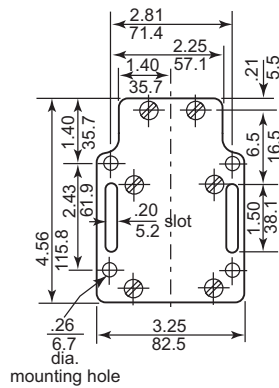


Type L300

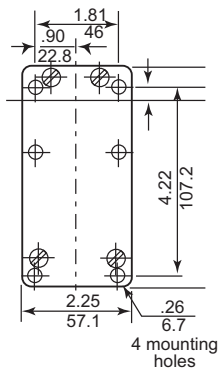


Base plates

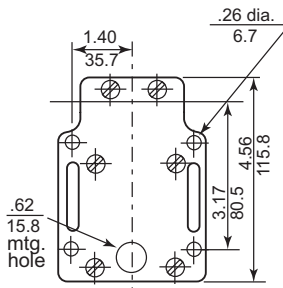
Style 1



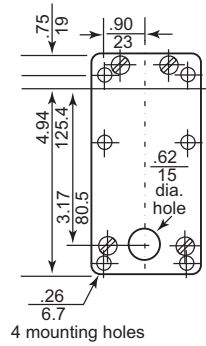
Style 2



Style 3

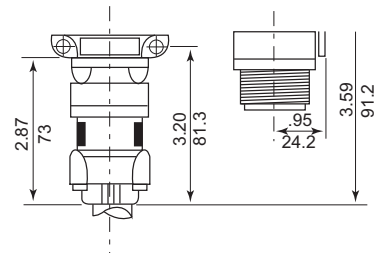


Style 4

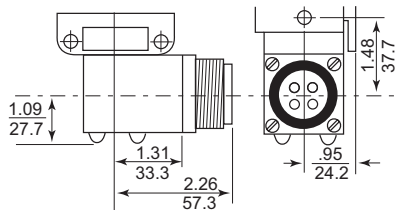


Receptacles

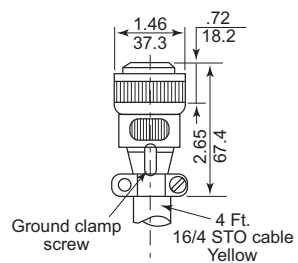
PL



APL



101000



Dual dimensions: $\frac{\text{in.}}{\text{mm}}$